



WUHAN TRIANGLE LAKE IS LOCATED AT THE KEY NODE OF THE EAST ASIAN-AUSTRALASIAN MIGRATORY BIRD FLYWAY, AND IS AN IMPORTANT "TRANSIT STATION" AND "GAS STATION" FOR WATERBIRDS. THE CORE GOAL OF THIS DESIGN IS TO RESTORE AND STRENGTHEN HABITAT FUNCTIONS AND ENSURE THE SAFE MIGRATION OF MIGRATORY BIRDS, AND TO CREATE AN ECOLOGICAL CORRIDOR WITH HARMONY BETWEEN HUMANS AND BIRDS. THROUGH SYSTEMATIC HABITAT RESTORATION AND INTELLIGENT MANAGEMENT, THE CARRYING CAPACITY AND ATTRACTIVENESS OF THE TRIANGLE LAKE TO MIGRATORY WATERBIRDS (SUCH AS CORMORANTS, RED-HEADED GULLS, VARIOUS EGRETS, GEESE, DUCKS, AND PLOVERS) WILL BE SIGNIFICANTLY IMPROVED, MAKING IT A SHINING ECOLOGICAL PEARL IN WUHAN'S "WETLAND FLOWER CITY", CONTRIBUTING TO THE CONSERVATION OF GLOBAL MIGRATORY BIRDS, AND PROVIDING CITIZENS WITH A UNIQUE SPACE FOR NATURE EDUCATION AND ECOLOGICAL EXPERIENCE.

EVALUATE WHETHER THE PROJECT CENTERS ON THE CORE THEME OF LANDSCAPE ECOLOGICAL PROTECTION. THE SYSTEMATIC CONCEPT OF "A HARMONIOUS ECO-CORRIDOR FOR HUMANS AND BIRDS" IN THE DESIGN OF TRIANGLE LAKE DEMONSTRATES THE INTEGRATION OF SCIENTIFIC LOGIC AND SOCIAL VALUES. ASSESS THE FEASIBILITY OF PROJECT IMPLEMENTATION, INCLUDING THE SCIENTIFIC VALIDITY AND PRACTICALITY OF HABITAT RESTORATION TECHNOLOGIES, APPLICATION OF ECO-FRIENDLY MATERIALS (SUCH AS PERMEABLE PAVEMENT), AND INTELLIGENT MONITORING SYSTEMS. CONSIDER THE PROJECT'S ACTUAL CONTRIBUTIONS TO PUBLIC EDUCATION (E.G., NATURAL EXPERIENCE SPACES) AND ECOLOGICAL PROTECTION, WHICH SHOULD HAVE QUANTIFIABLE BENEFIT PROJECTIONS OR INITIAL OUTCOMES.

Title of the project	WUHAN SANJIAO LAKE INTELLIGENT PROTECTION PLAN FOR EAST ASIAN MIGRATORY BIRDS MIGRATION
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Title of the course	CULTURAL LANDSCAPE DESIGN RESEARCH
Academic year	FIRST-YEAR MASTER'S STUDENT
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Department / Section / Program of belonging	SCHOOL OF ARCHITECTURE AND ART, BEIJING JIAOTONG UNIVERSITY
University / School	BEIJING JIAOTONG UNIVERSITY



Written statement, short description of the project in English, no more than 250 words

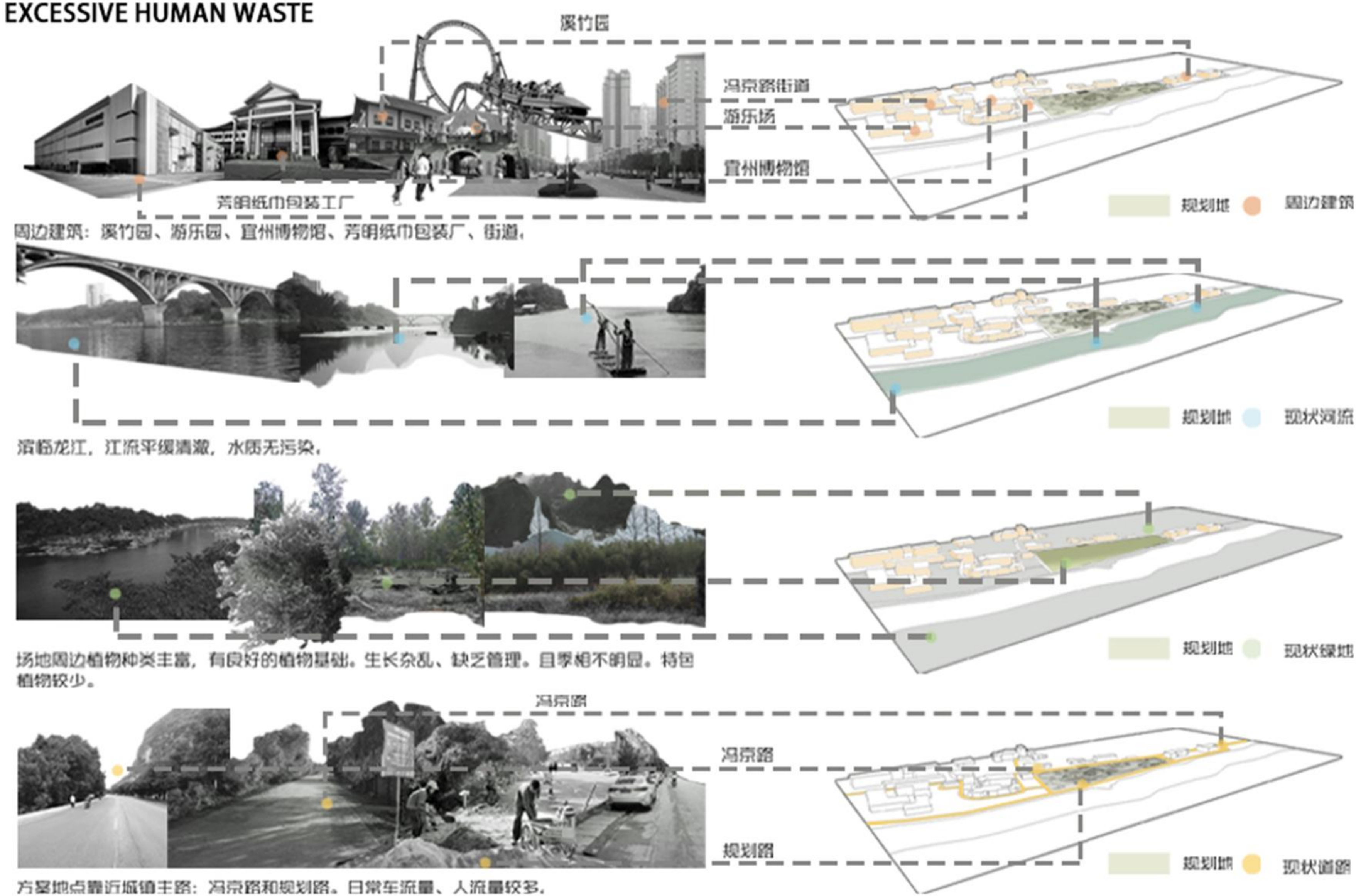
AS A KEY NODE OF THE EAST ASIAN-AUSTRALASIAN MIGRATORY BIRD FLYWAY, THE ECOLOGICAL RESTORATION PROJECT OF WUHAN SANJIAO LAKE TAKES "INTELLIGENT PROTECTION" AS ITS CORE TO BUILD A SMART ECO-CORRIDOR FOR THE HARMONIOUS COEXISTENCE OF HUMANS AND BIRDS. THE PROJECT ACHIEVES SYSTEMATIC PROTECTION THROUGH THREE DIMENSIONS: FIRST, SPATIAL SEGREGATION DESIGN DIVIDES THE CORE ECOLOGICAL AREA AND PERIPHERAL TOURIST AREA, NATURALLY ISOLATED BY WATER SYSTEMS AND VEGETATION, WITH CONCEALED BIRD-WATCHING FACILITIES TO REDUCE HUMAN DISTURBANCE; SECOND, INTELLIGENT TECHNOLOGY APPLICATION INCLUDES AN ADJUSTABLE WATER LEVEL SYSTEM TO SIMULATE NATURAL HYDROLOGICAL RHYTHMS, COMBINED WITH AI-BASED CROWD FLOW MANAGEMENT AND ANTI-GLARE LIGHTING TO ENHANCE HABITAT CARRYING CAPACITY; THIRD, ECOLOGICAL FUNCTION INTEGRATION IMPROVES WATER QUALITY THROUGH LIVING WATER INTRODUCTION AND RESTORES SHALLOW-WATER AND MUDFLAT HABITATS, PROVIDING STABLE "TRANSIT STATIONS" FOR MIGRATORY WATERBIRDS SUCH AS CORMORANTS AND BLACK-HEADED GULLS.

Barcelona International Landscape Biennial

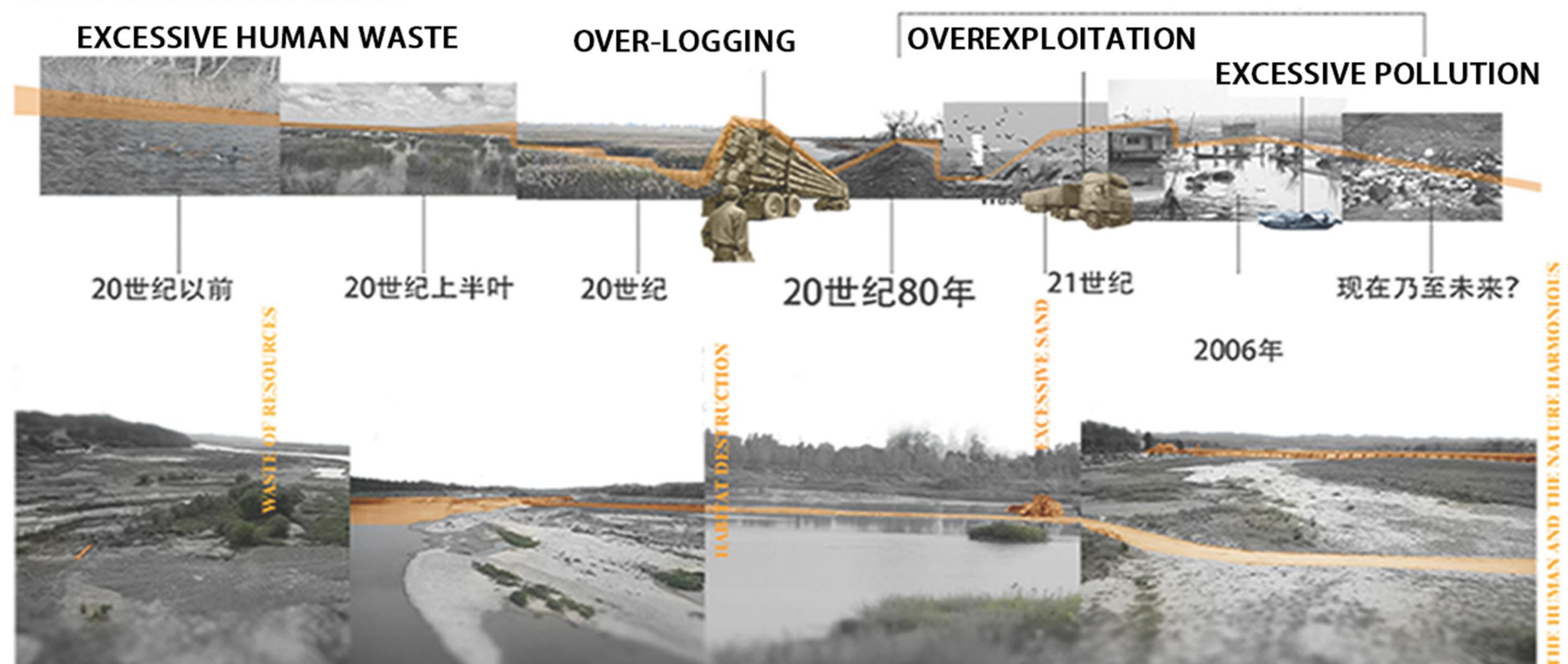
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Venue:
COAC - Col·legi Oficial d'Arquitectes de Catalunya
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EXCESSIVE HUMAN WASTE



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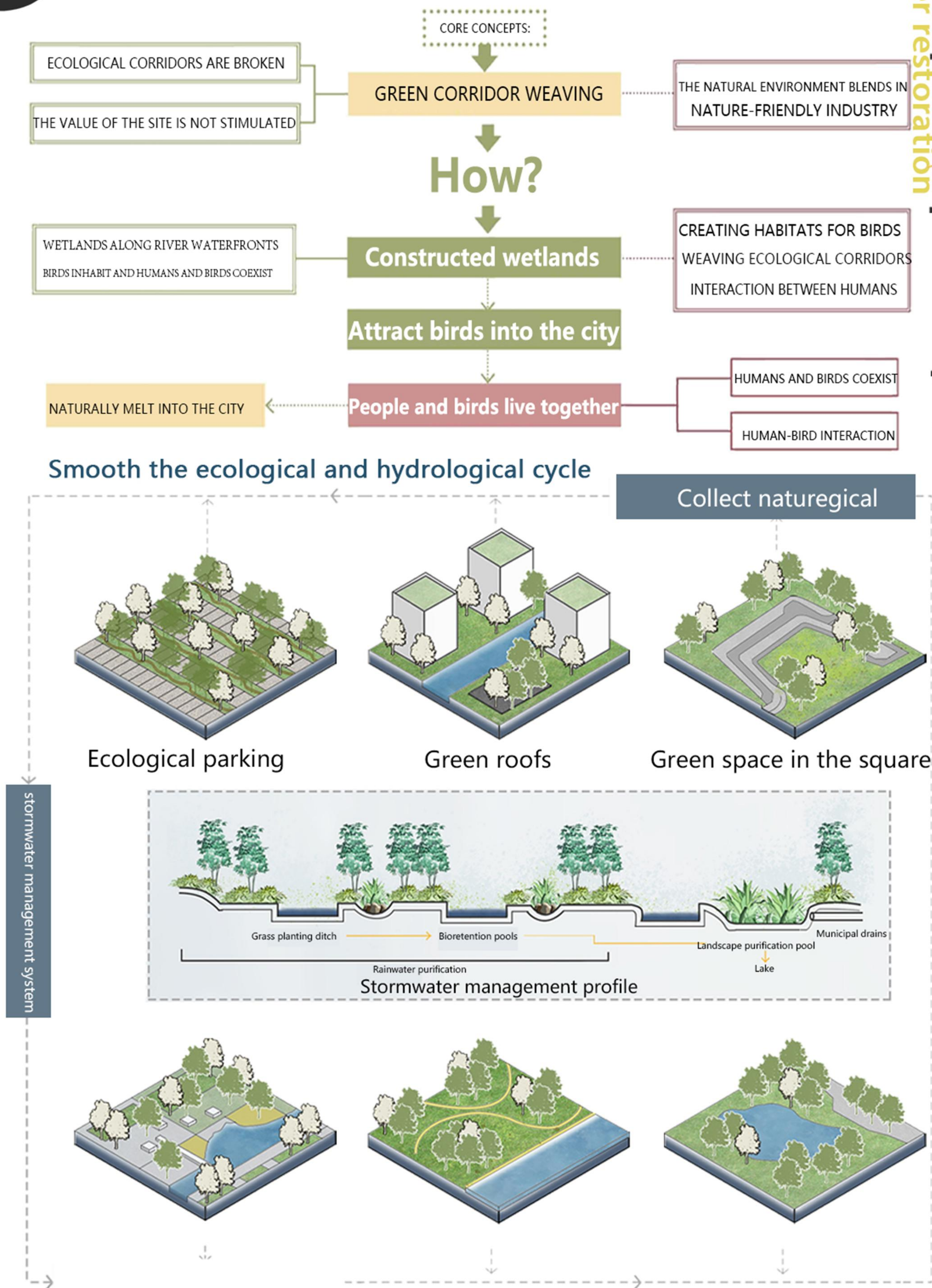


EXCESSIVE HUMAN WASTE

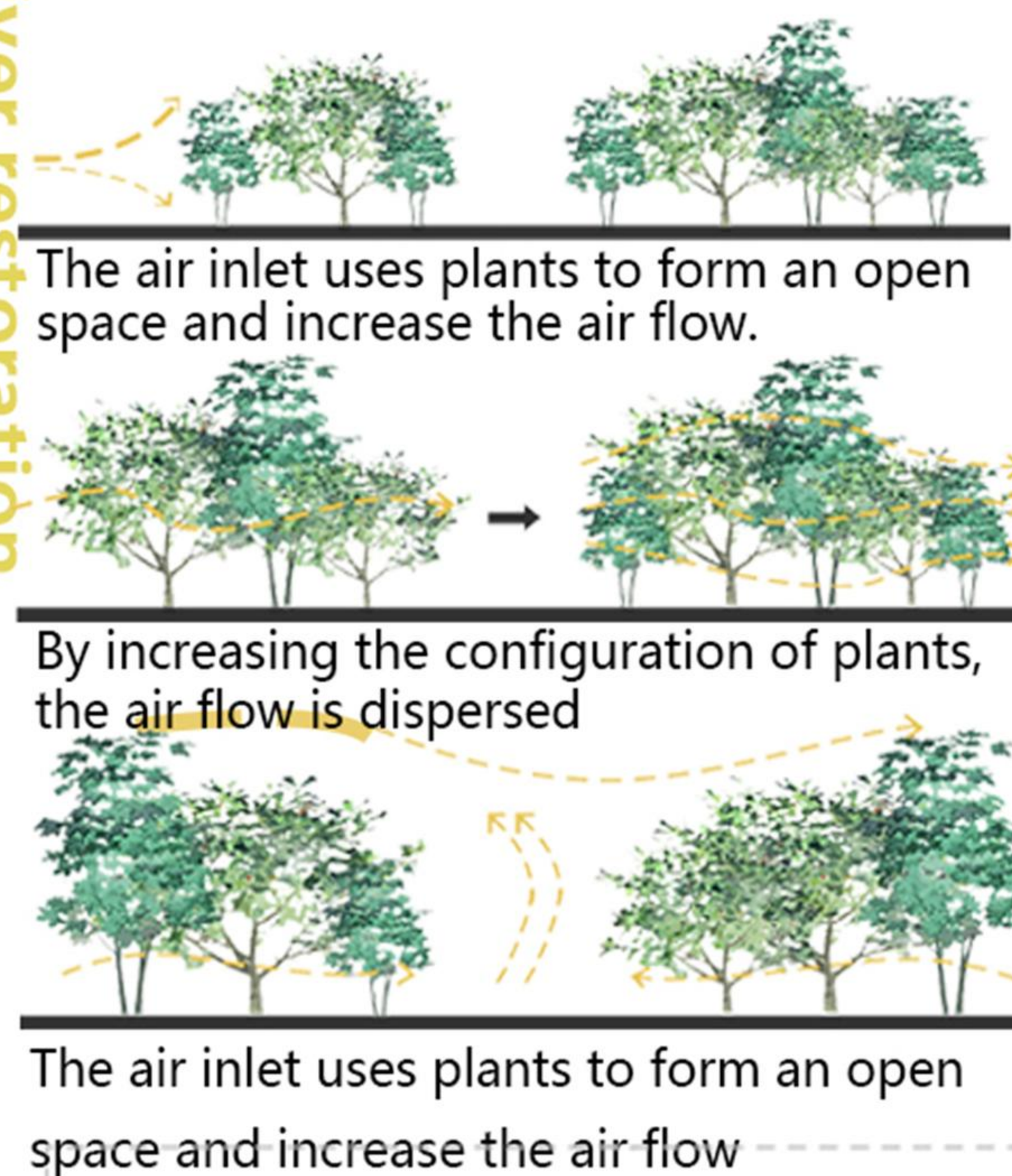




STRATEGY 1: ESTABLISH A COMMUNITY CO-MANAGEMENT MECHANISM



River restoration



Bird analysis

Wandering birds

通勤鸟: 居住地点与入职地点分离, 在通勤上花费时间较长。

漂泊鸟: 因为其工作流动性, 其租房流动性较大, 融入城市感情强烈。

Commuter birds

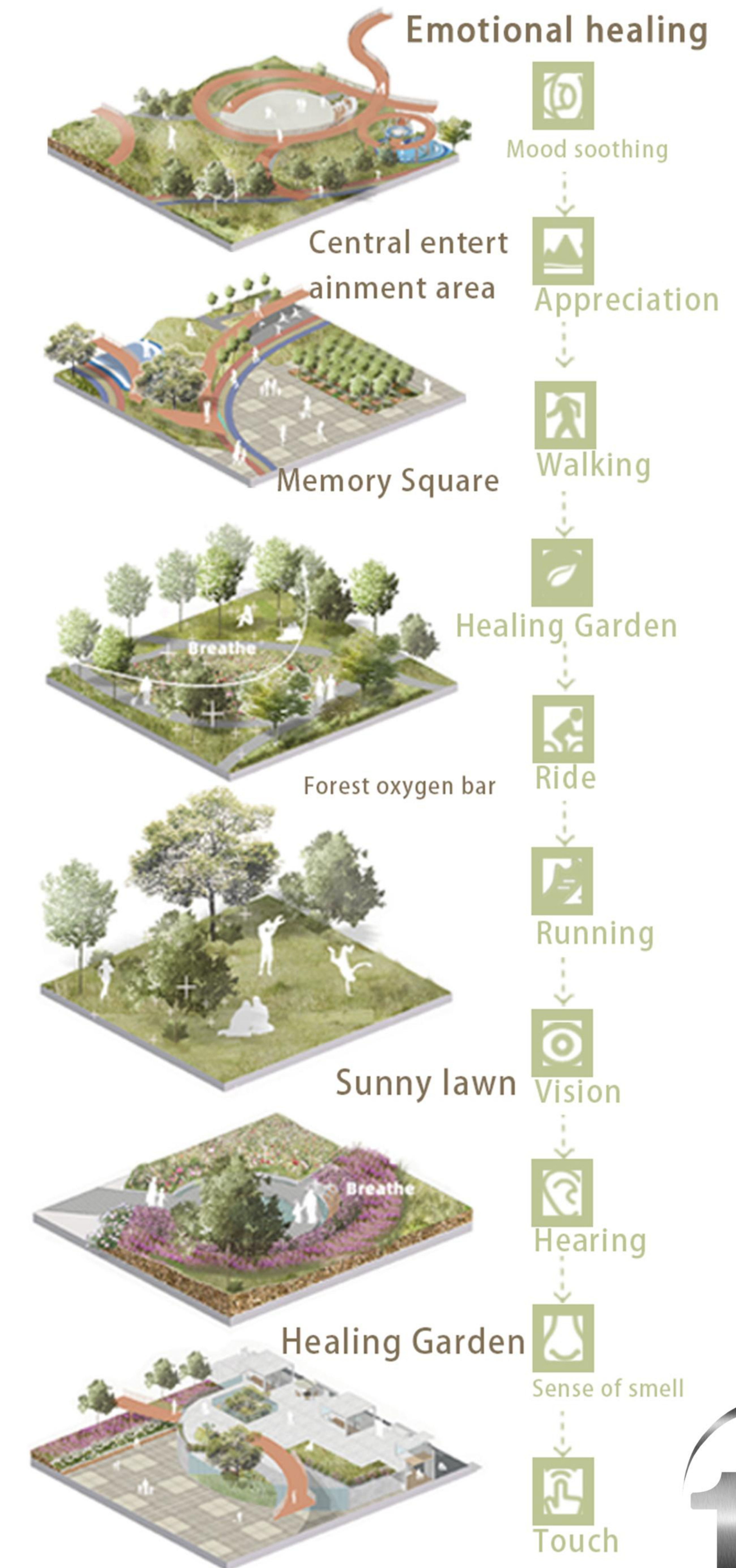
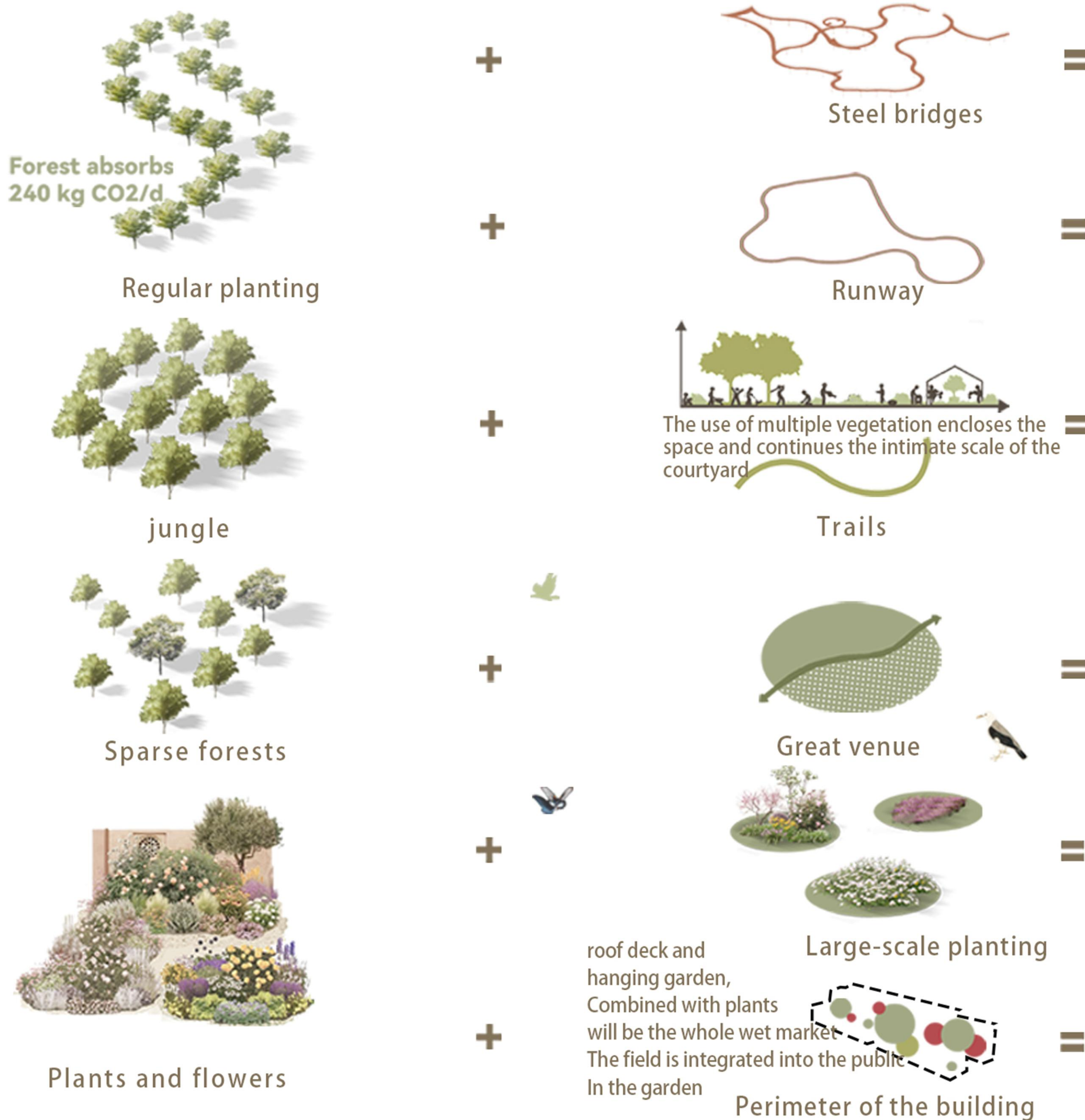
Bluebird

青鸟: 高教育水平、初入社会的职场小白, 有一定经济实力。



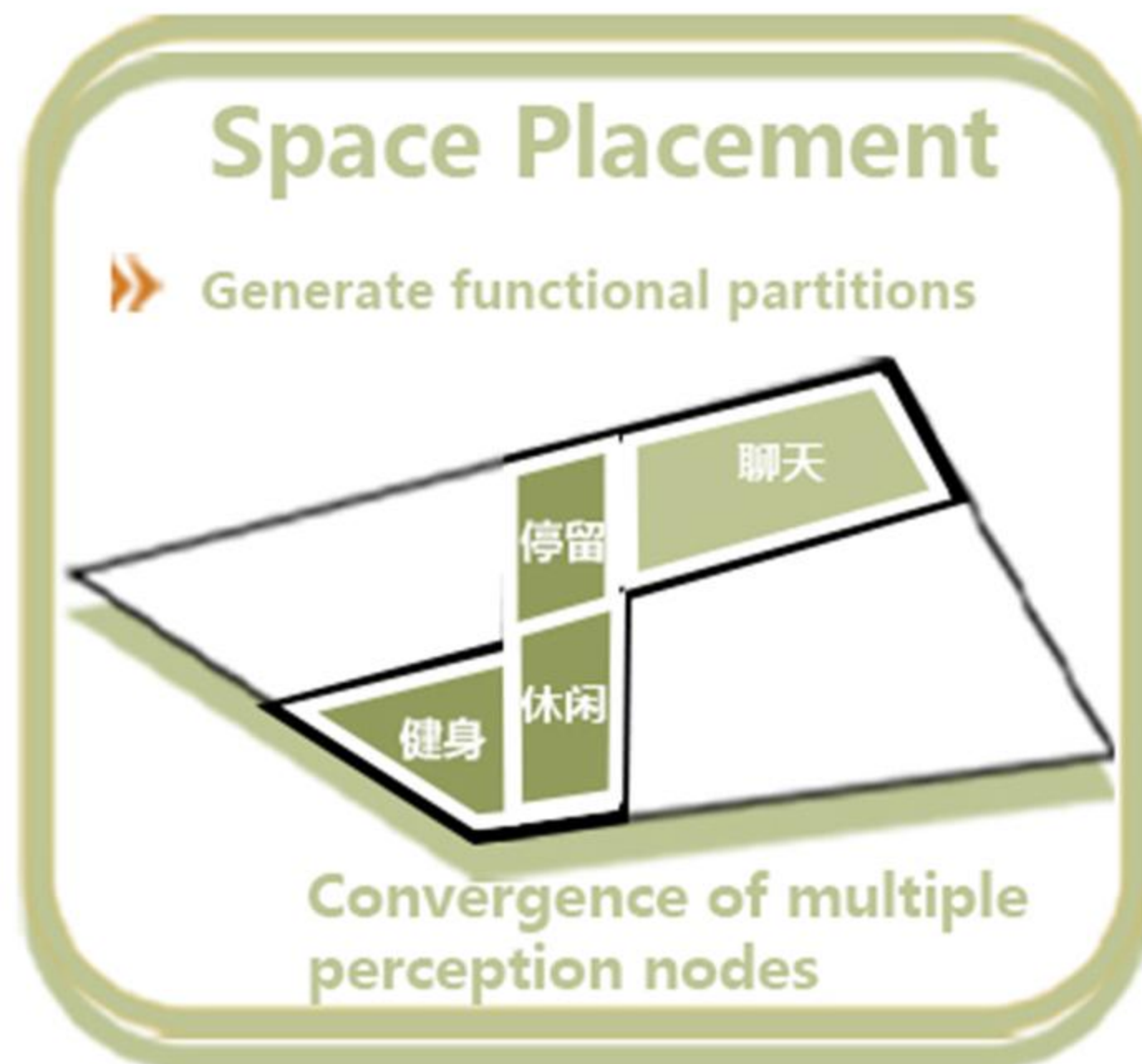
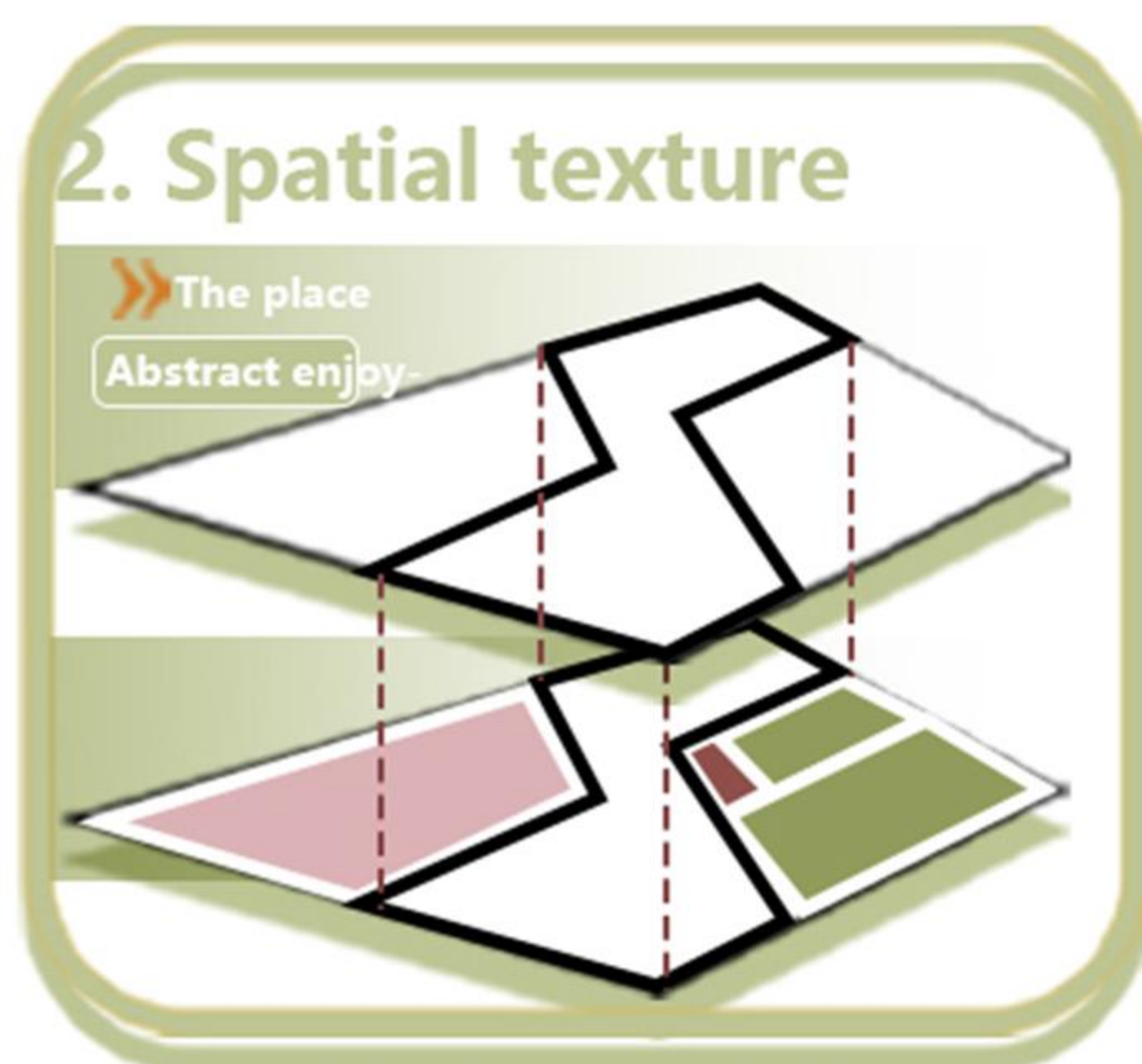
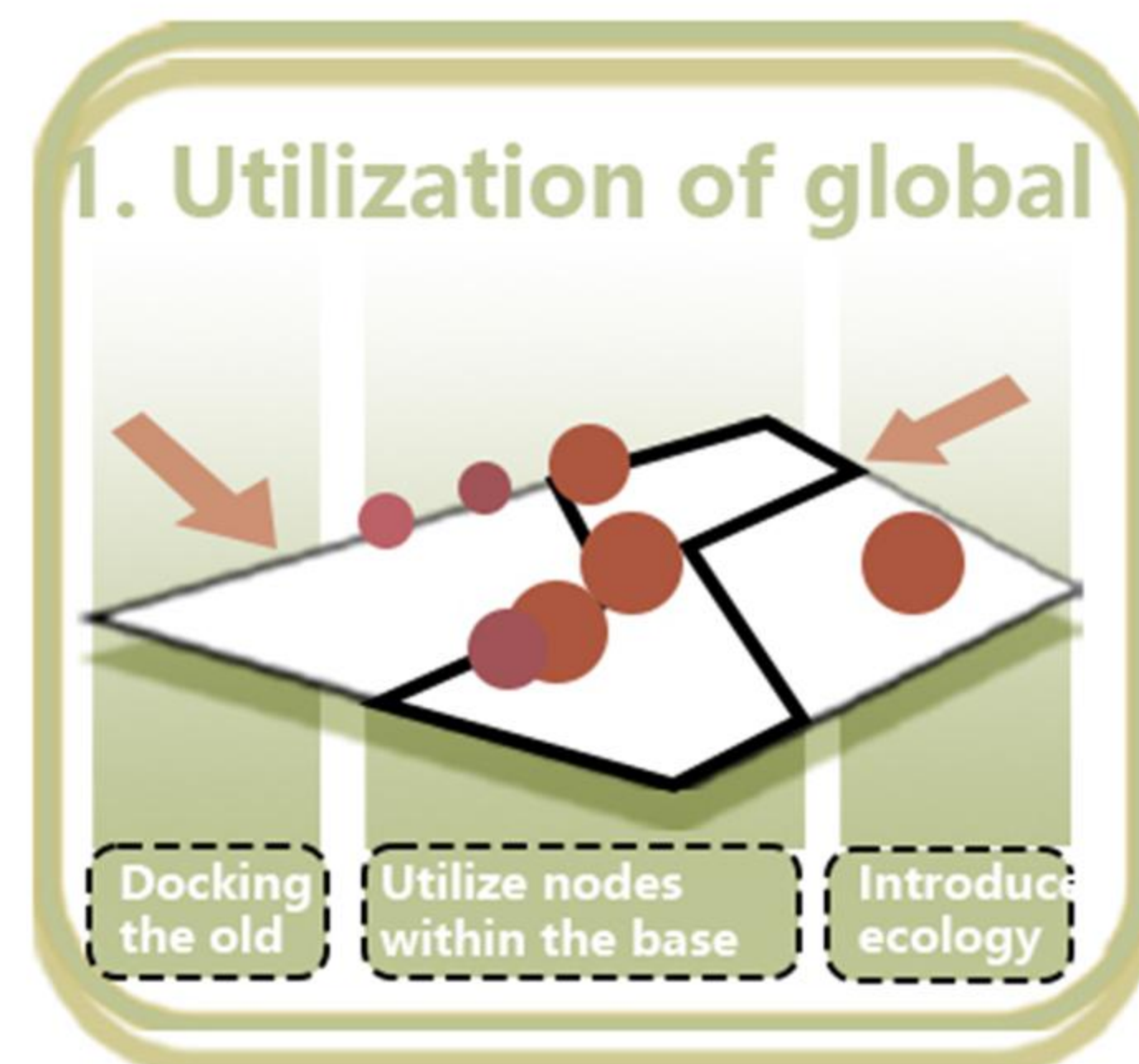
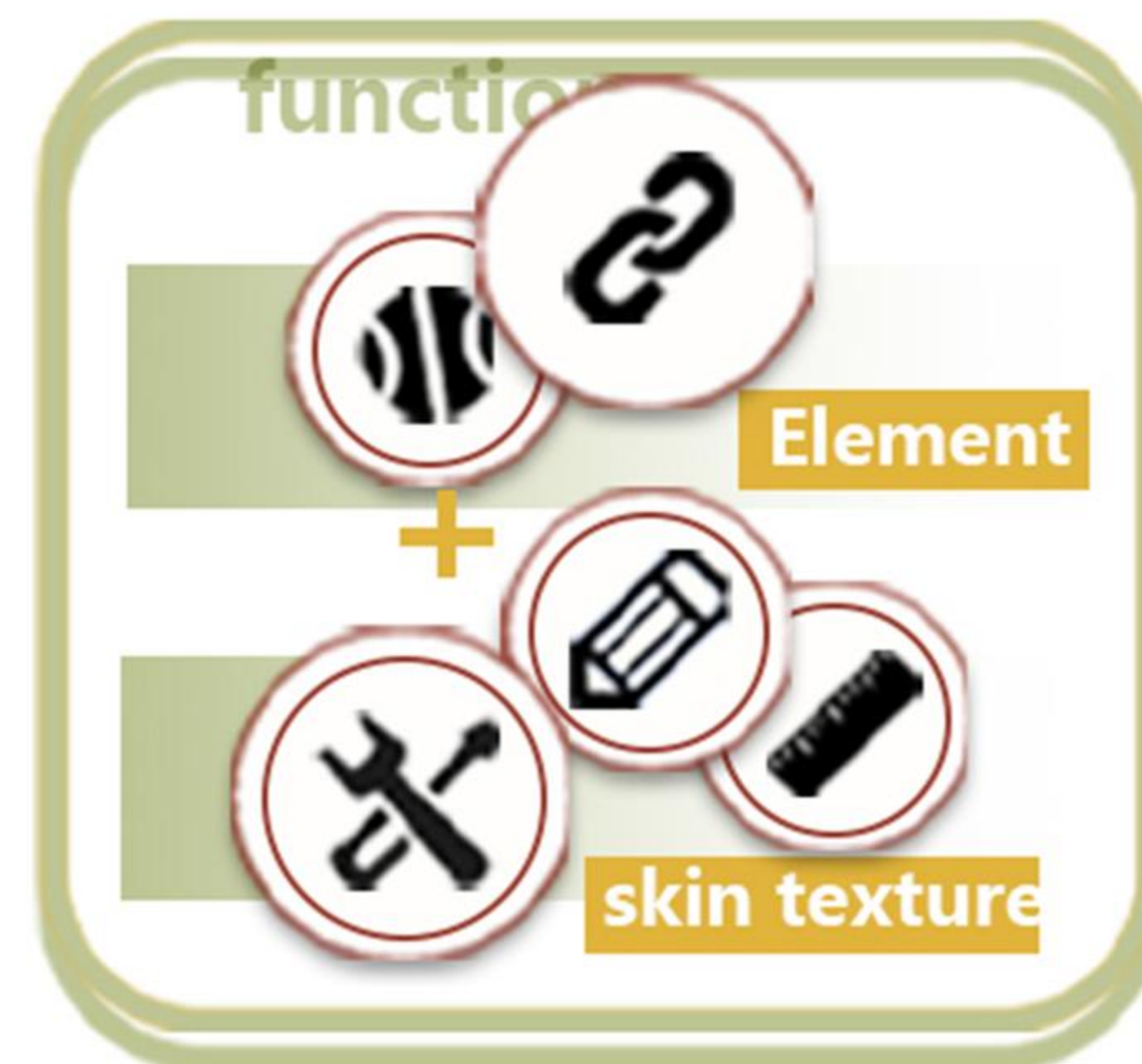
city's hydrological system

By using the fluidity and permeability of the ecology, different spaces are filled and restored. Through ecological planting and landscape planting, Change the design of the original park sports facilities, link ecology with sports and healing, and create a composite functional module

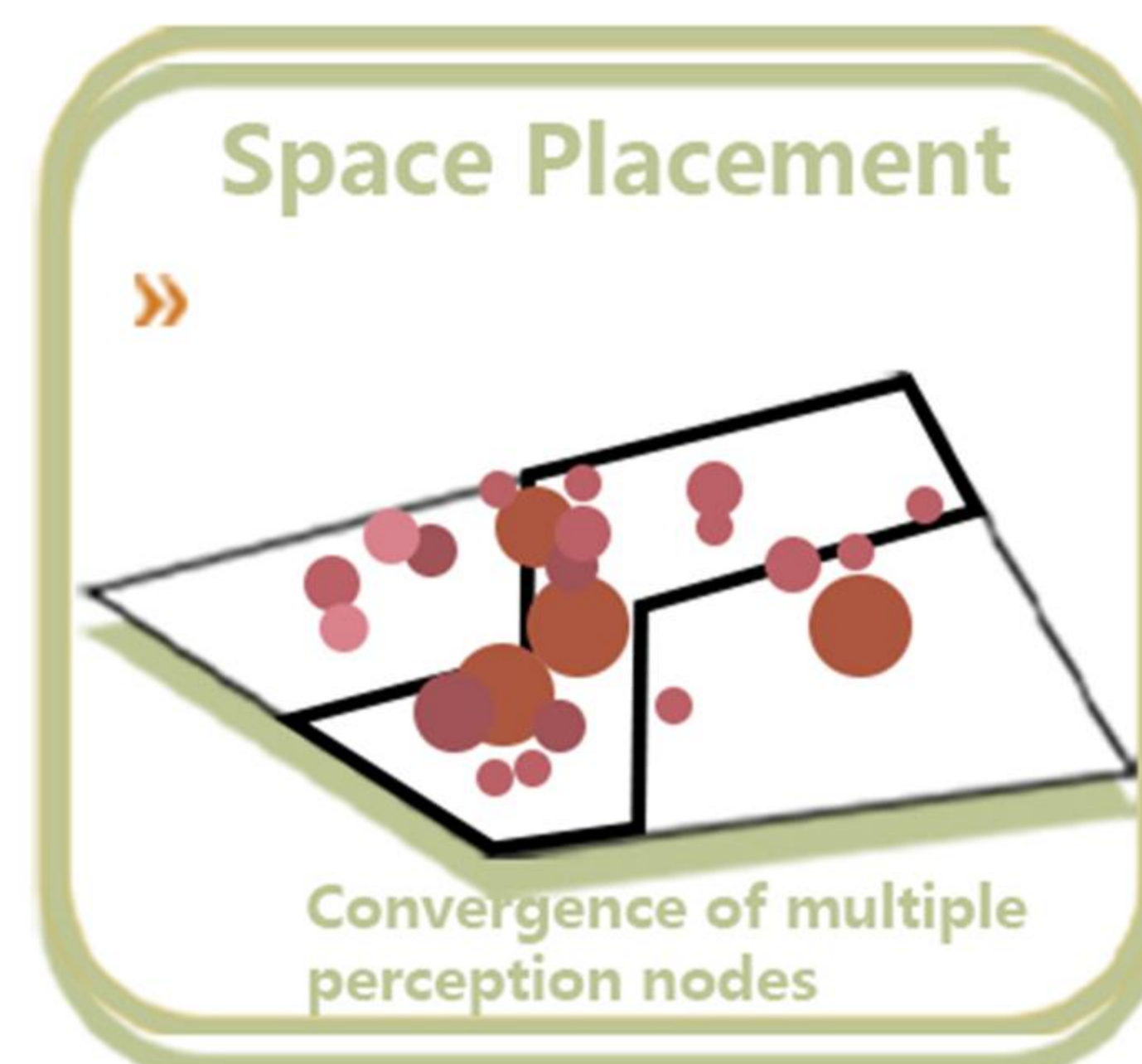
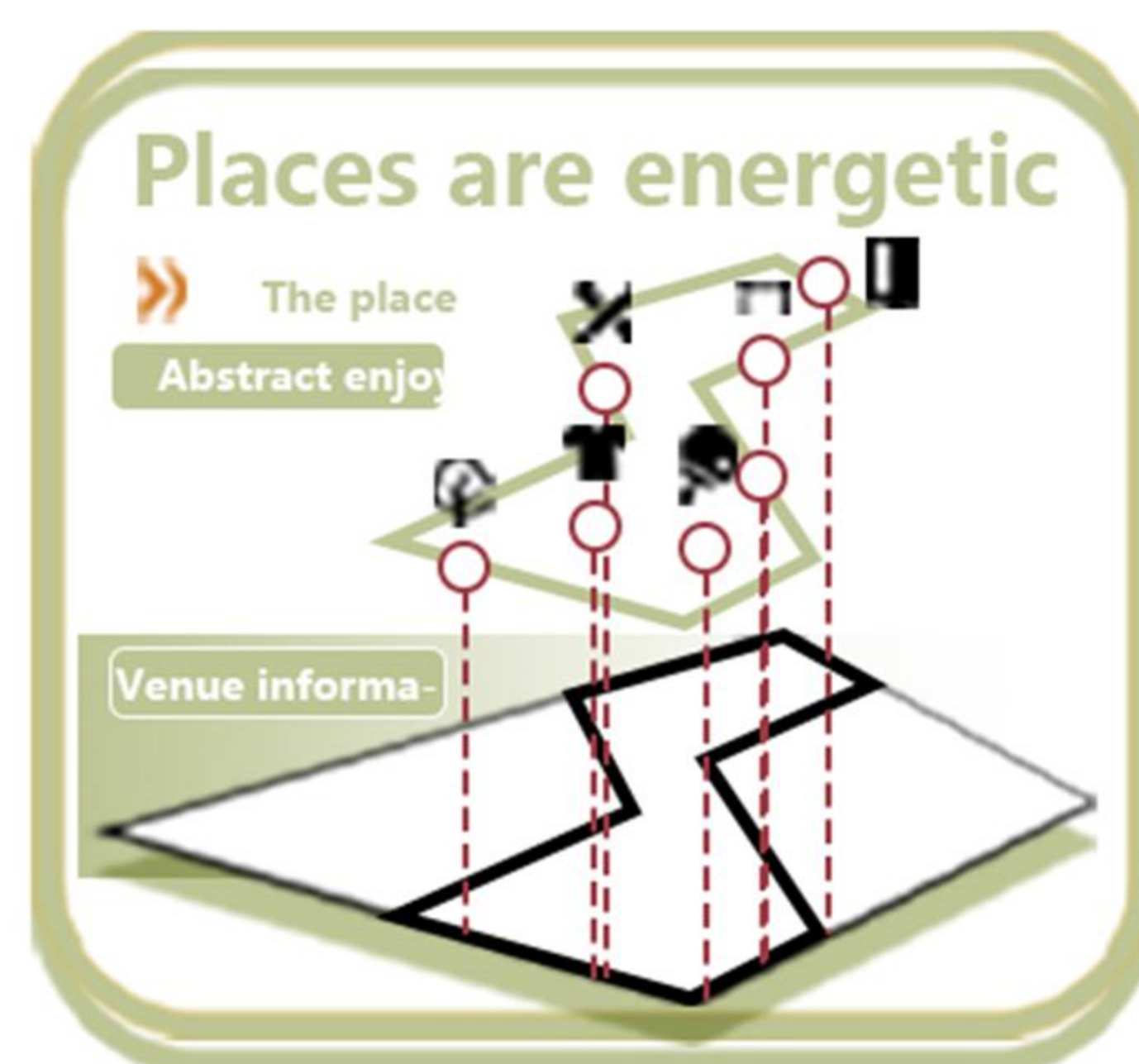
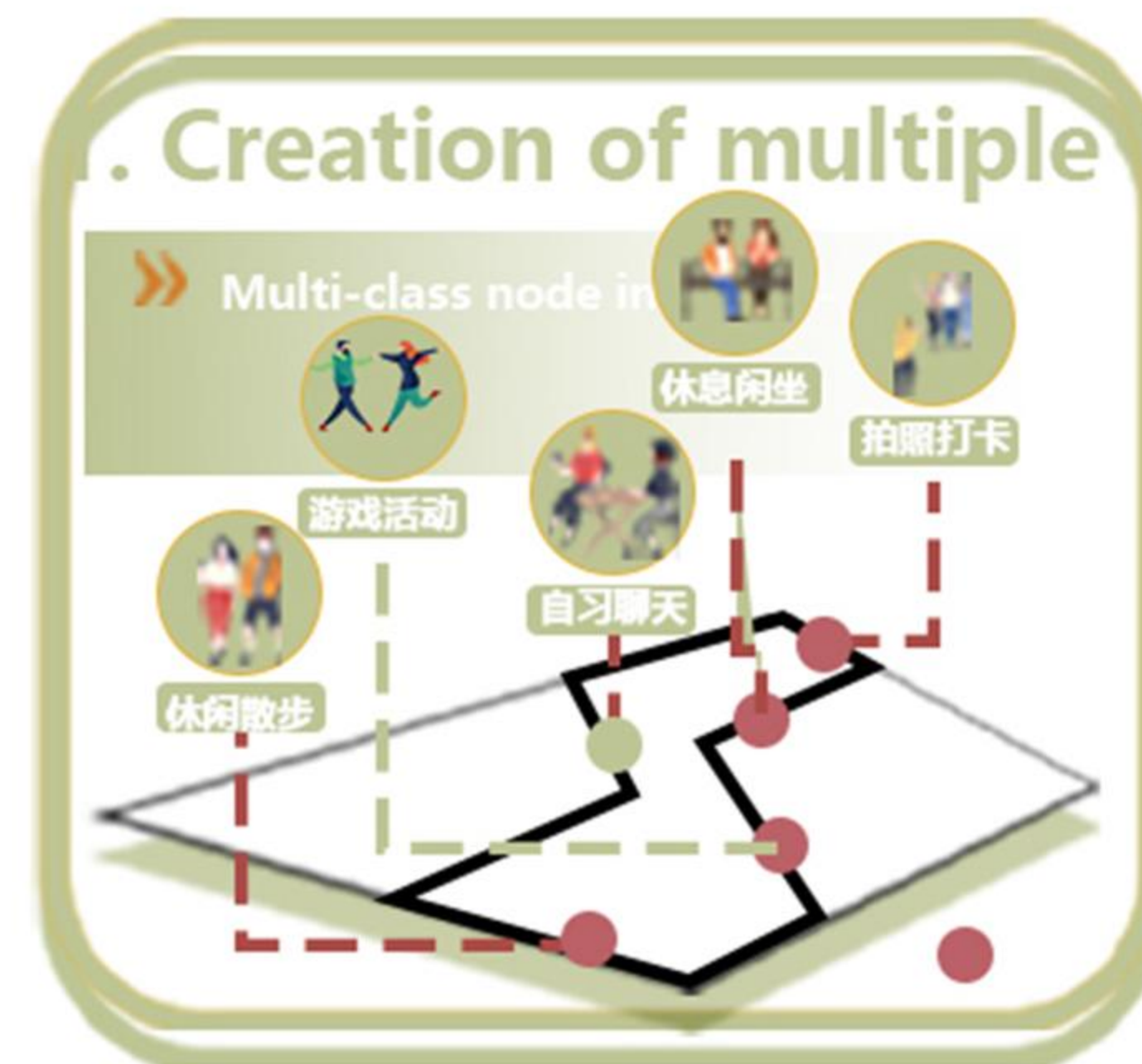
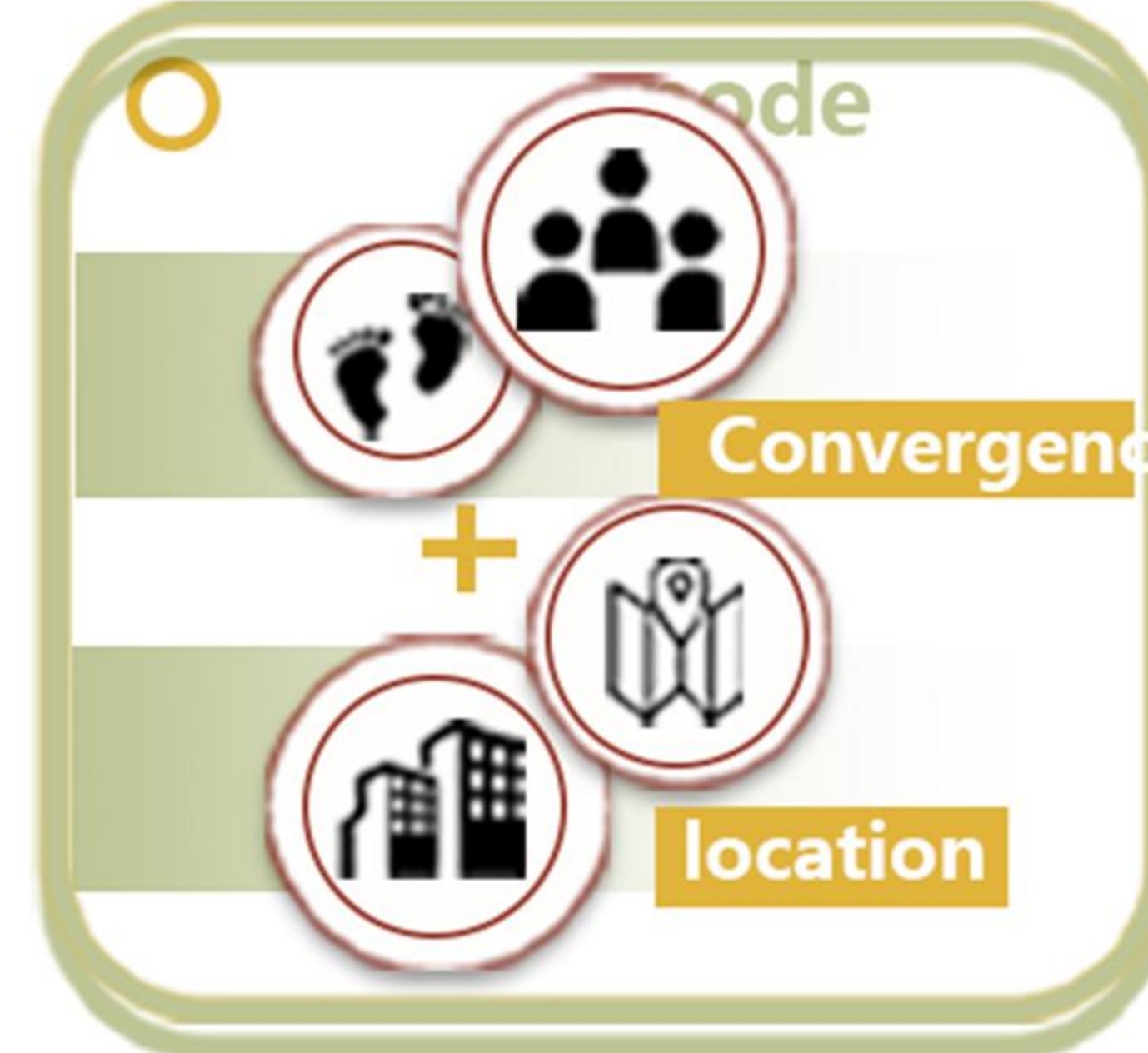


city's hydrological system

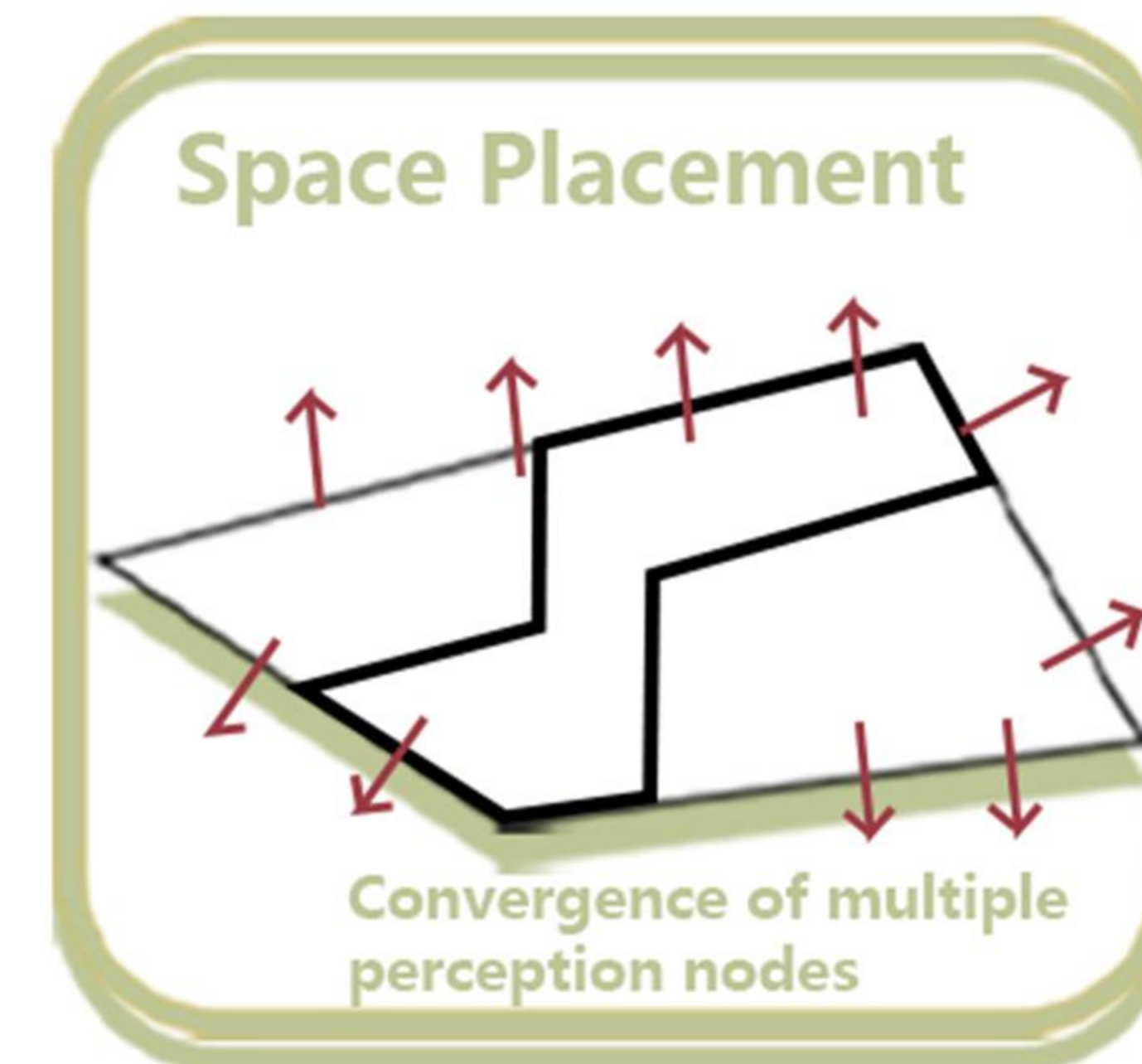
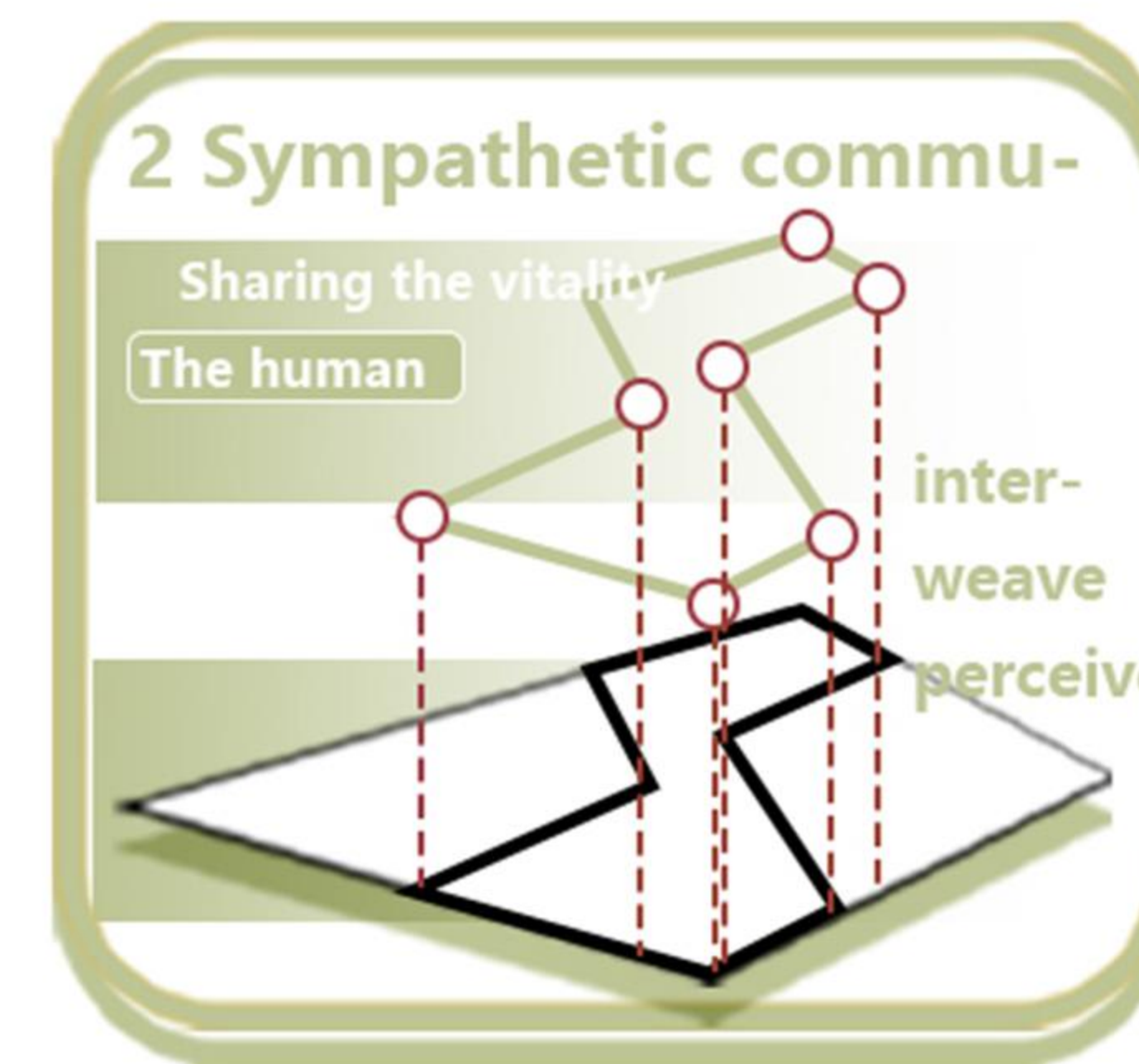
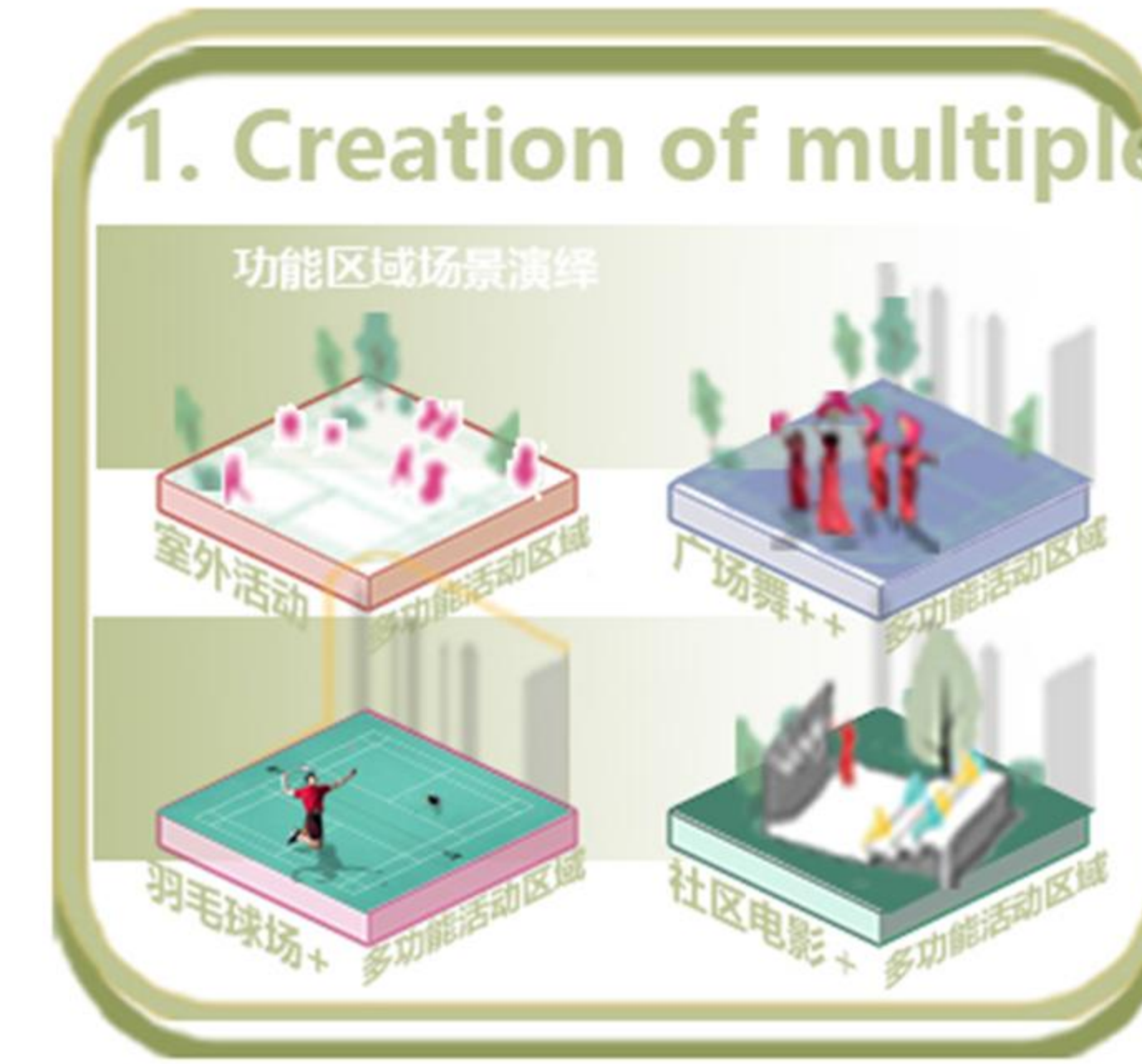
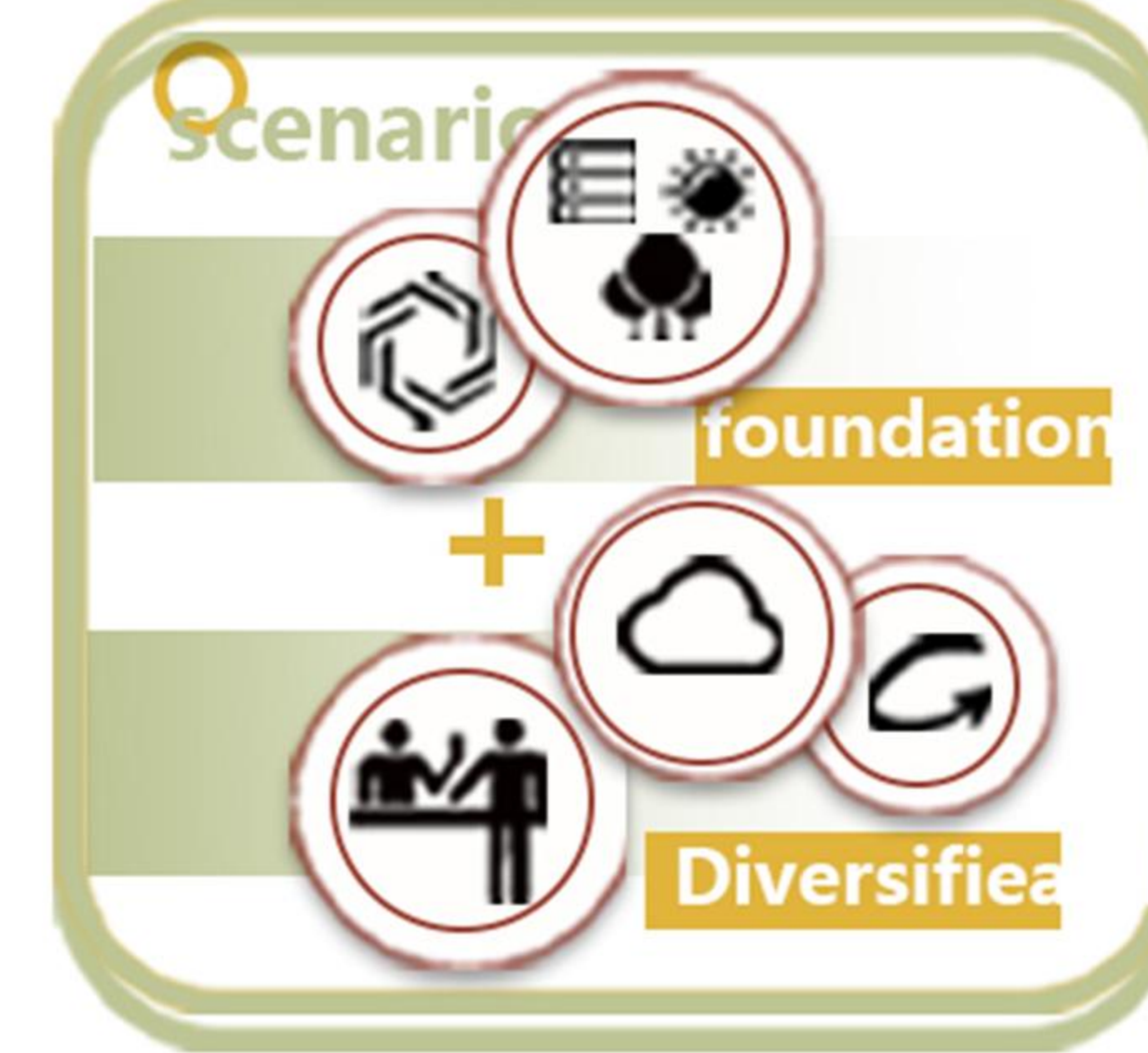
Spatial function creation



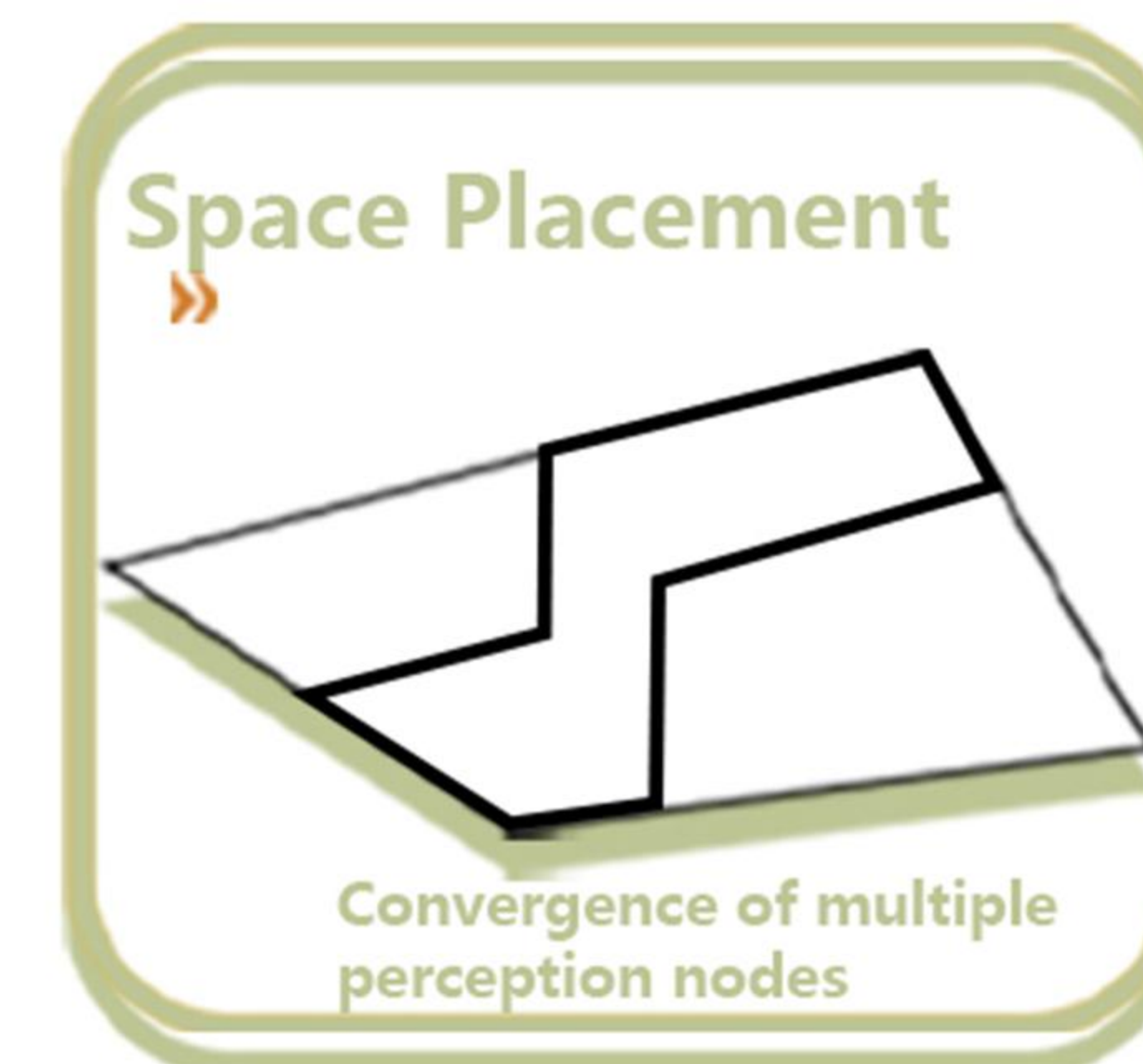
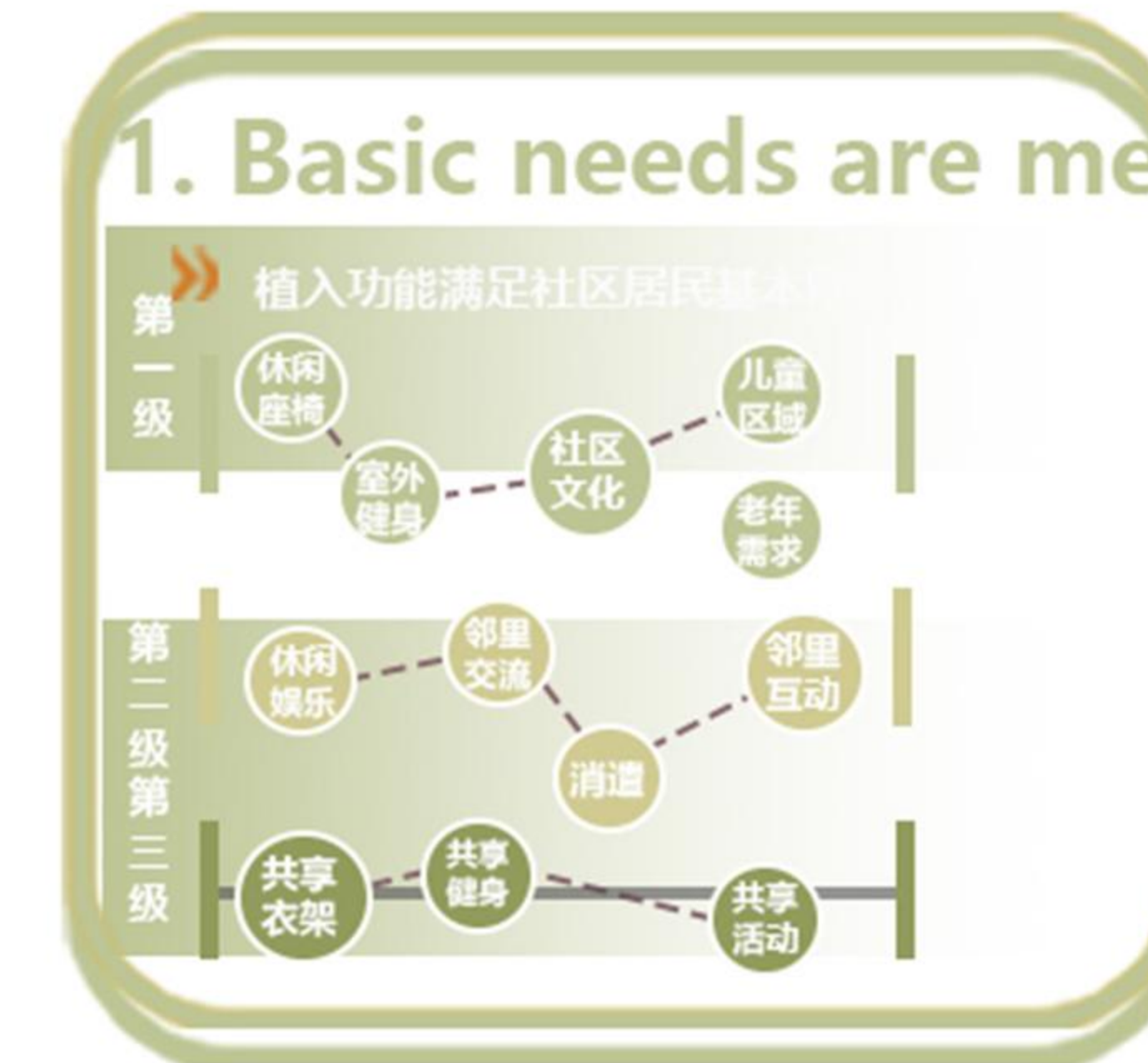
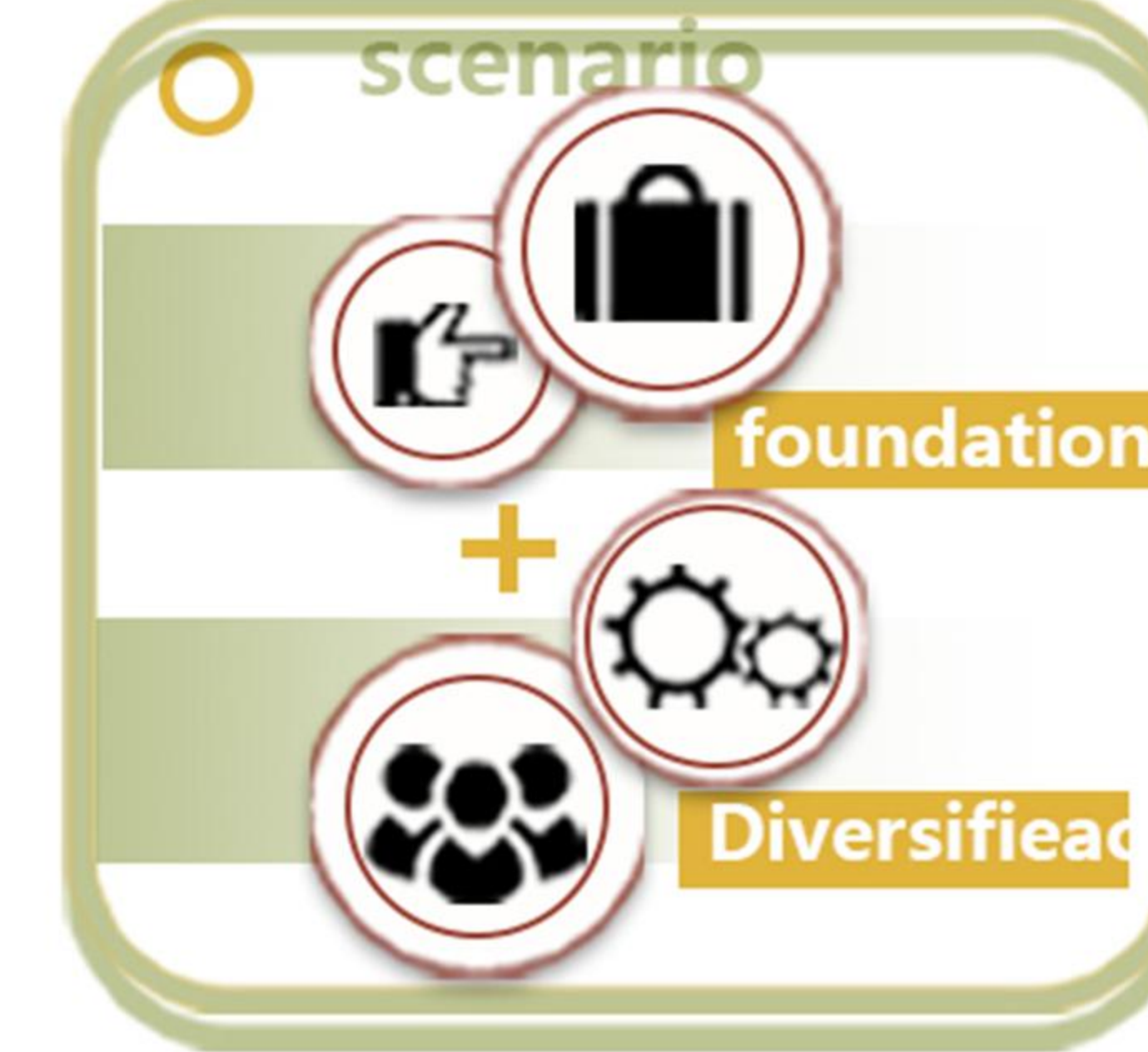
Environment scene



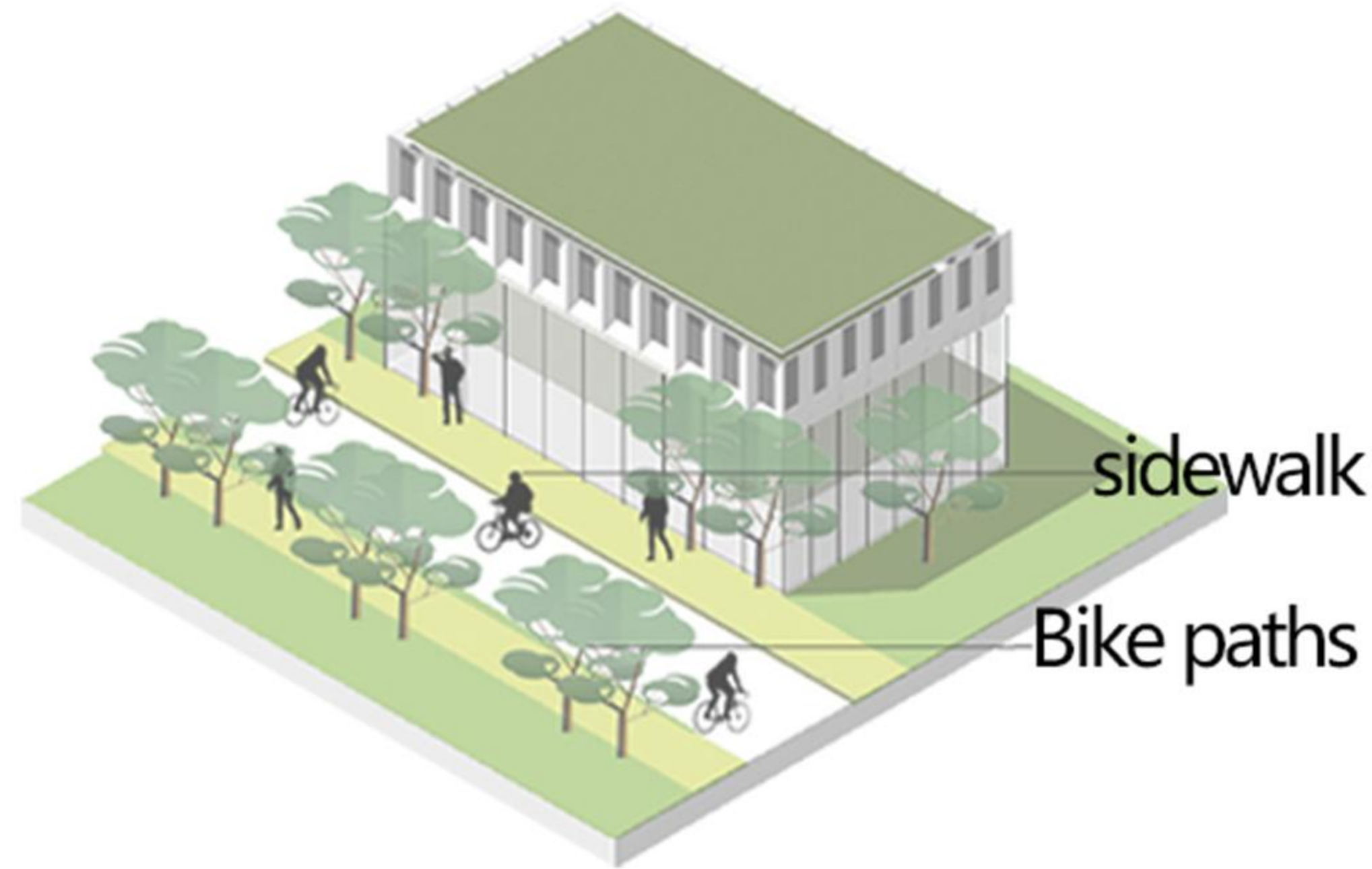
Implantation



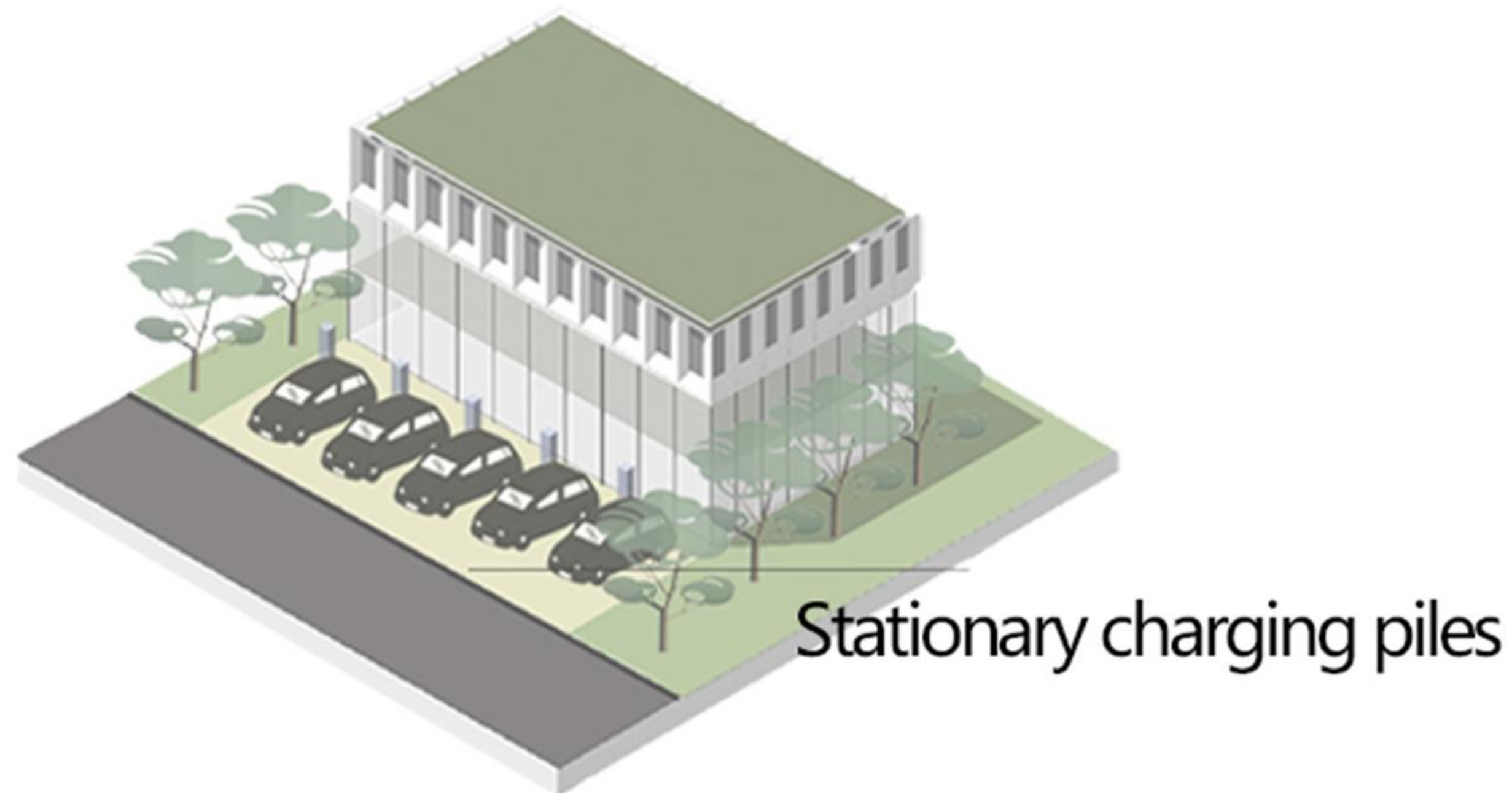
Shared mode



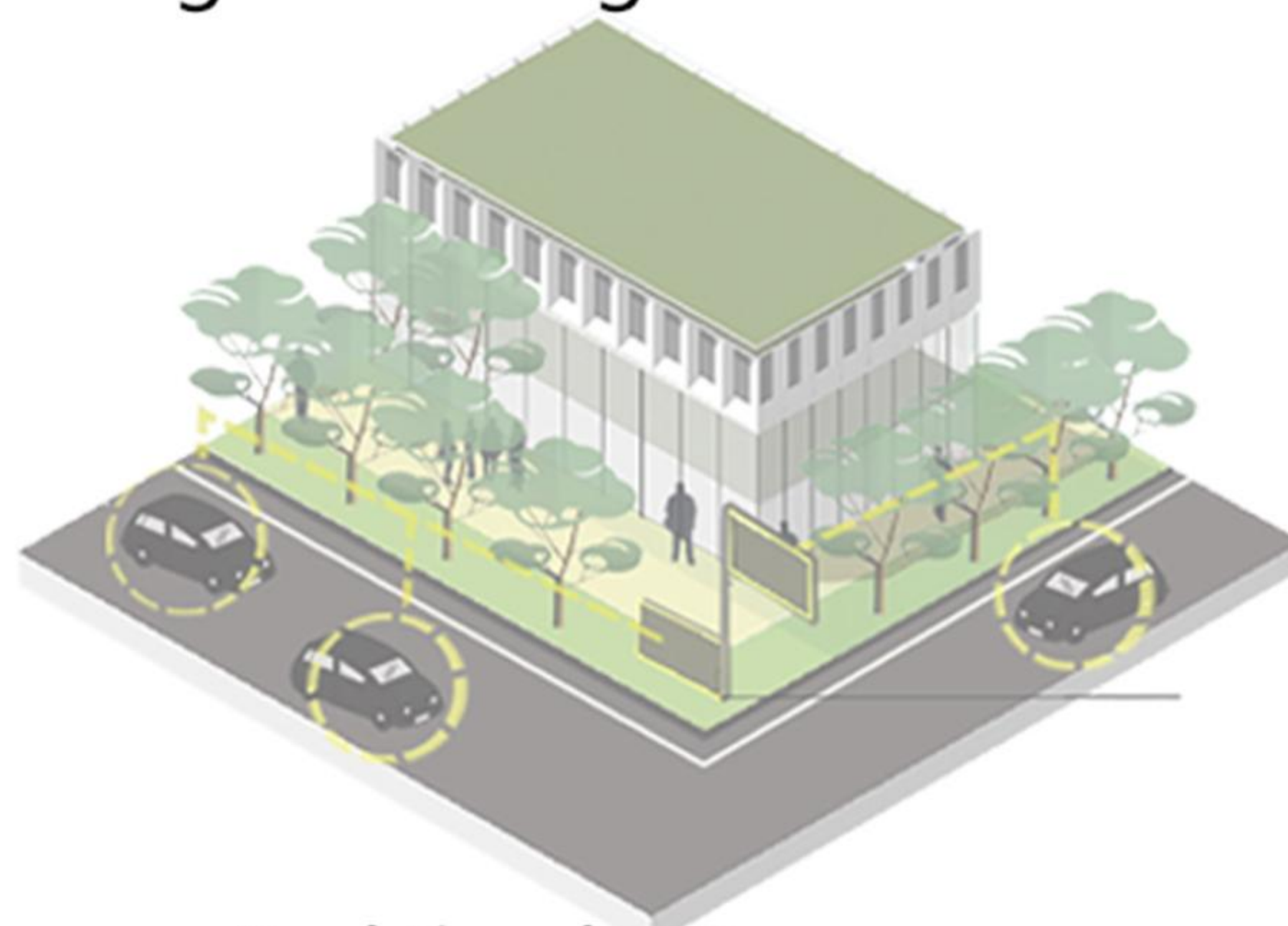
Construction of landscape axis drainage infiltration



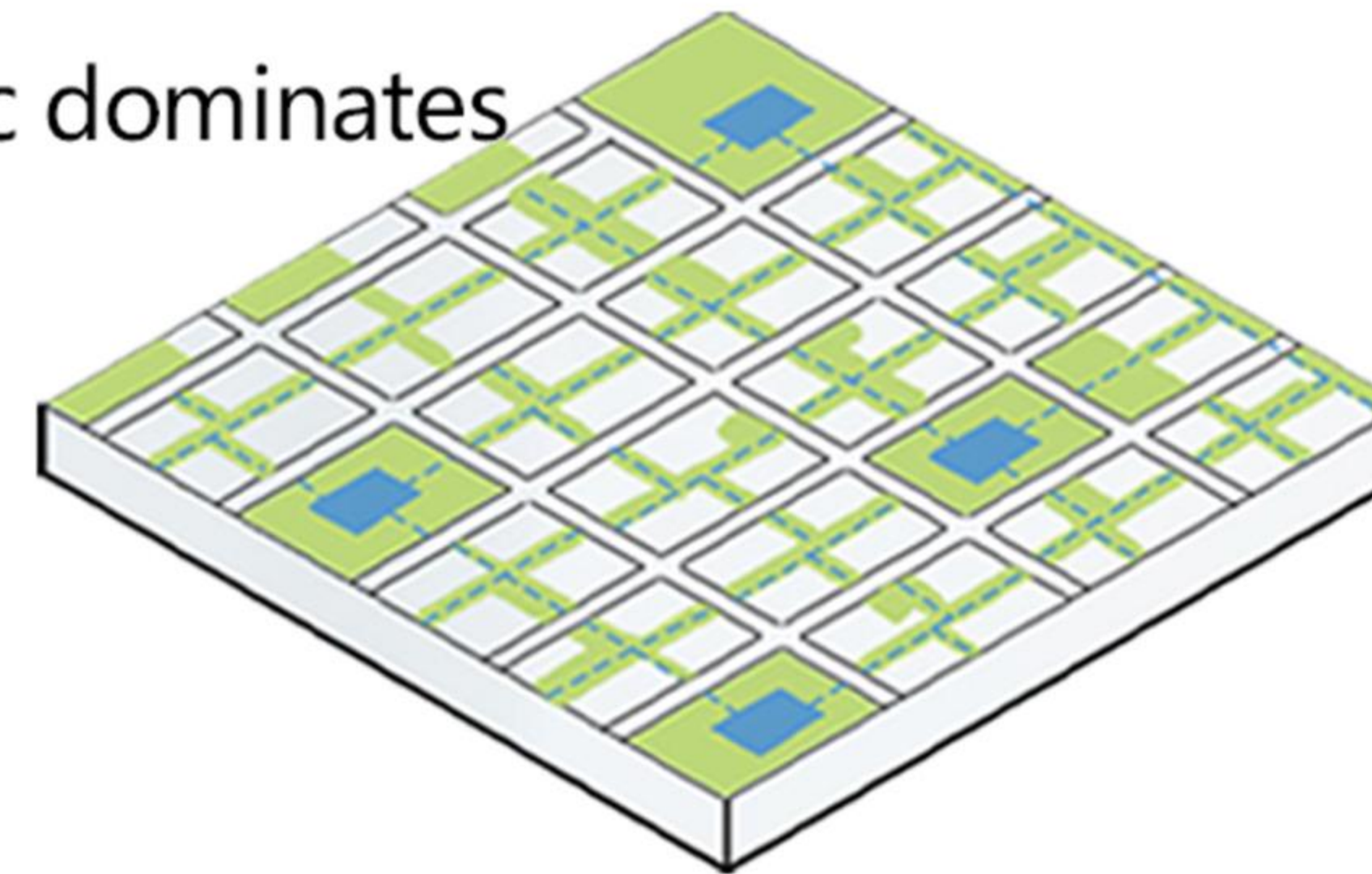
Clean energy



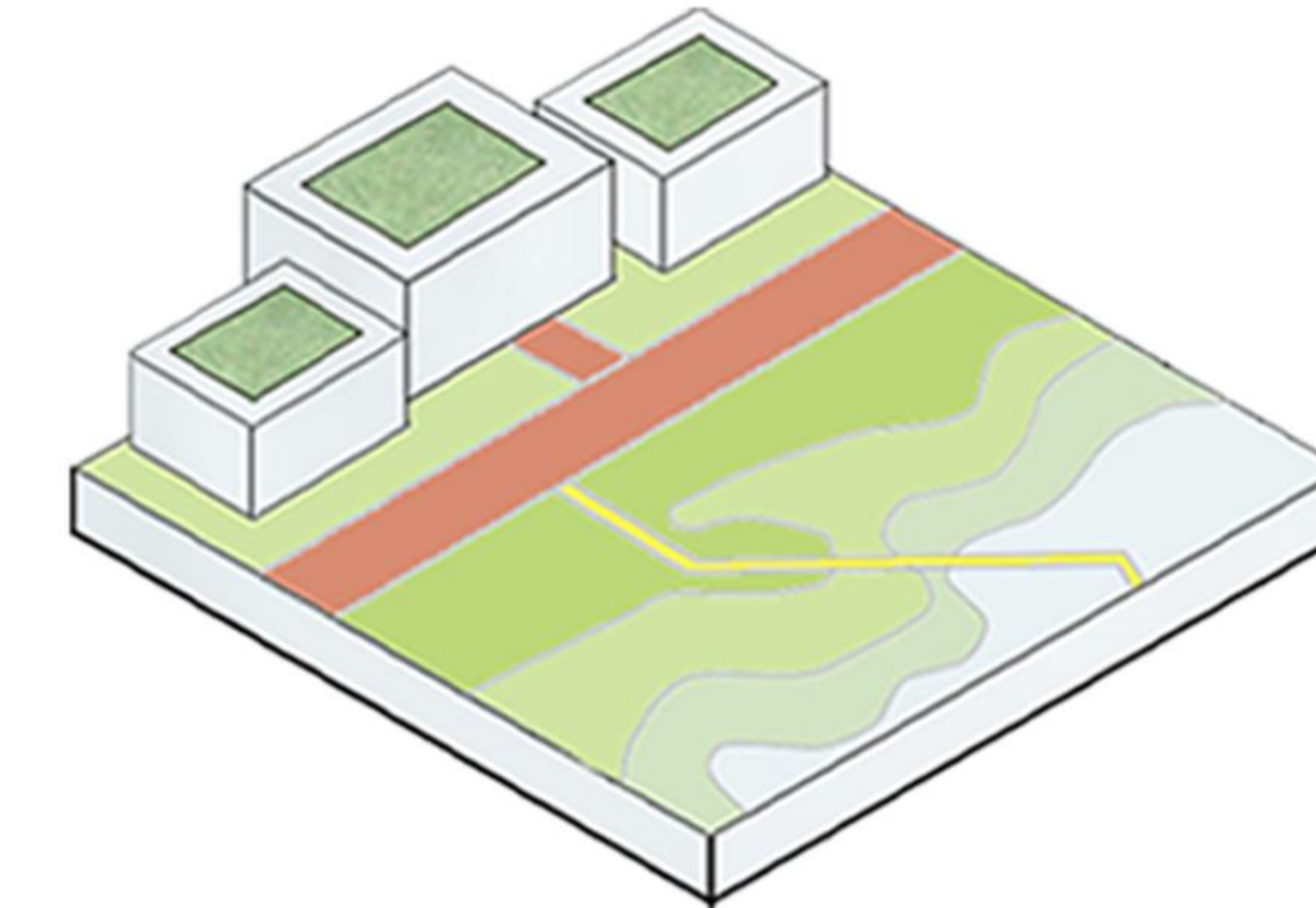
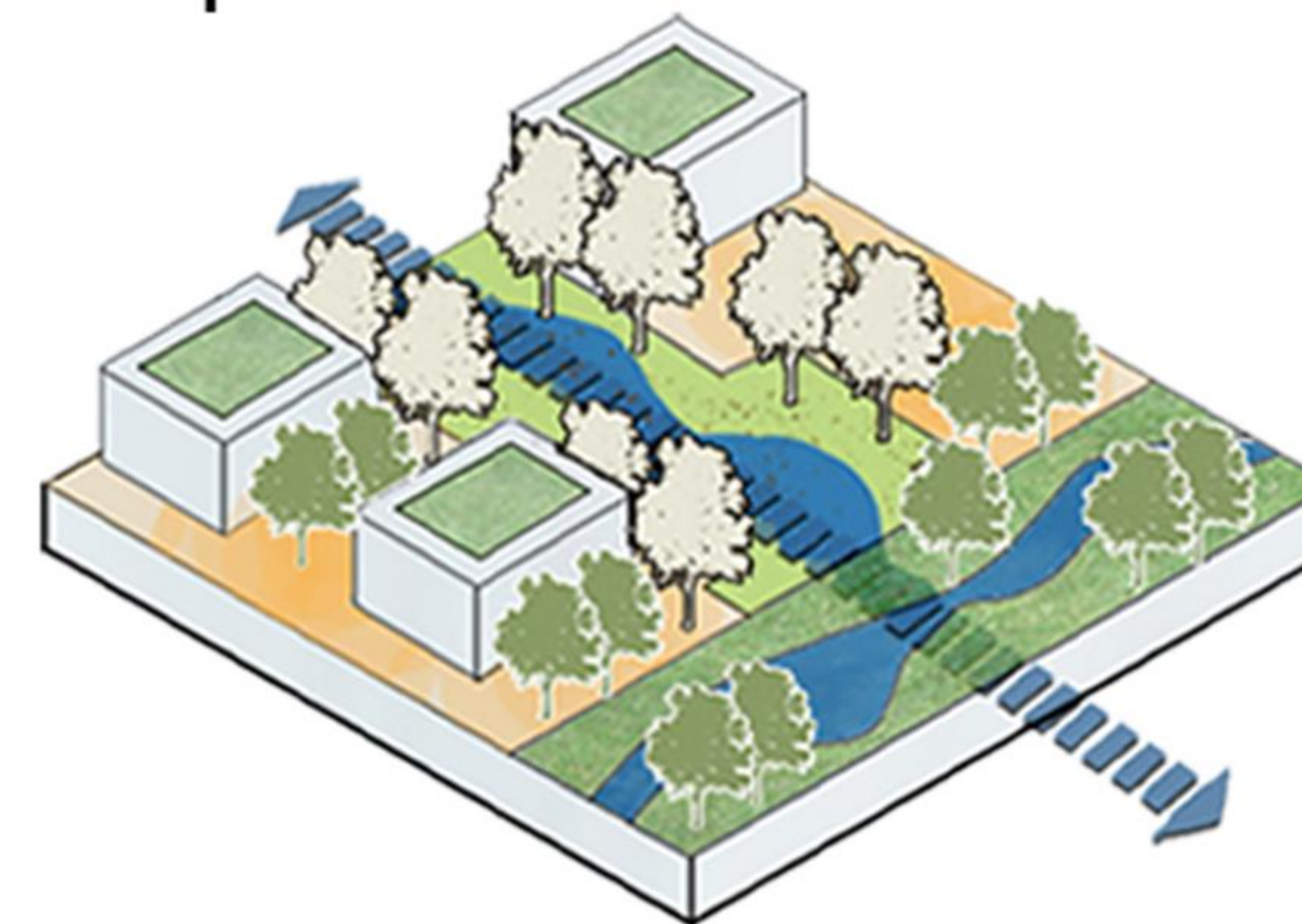
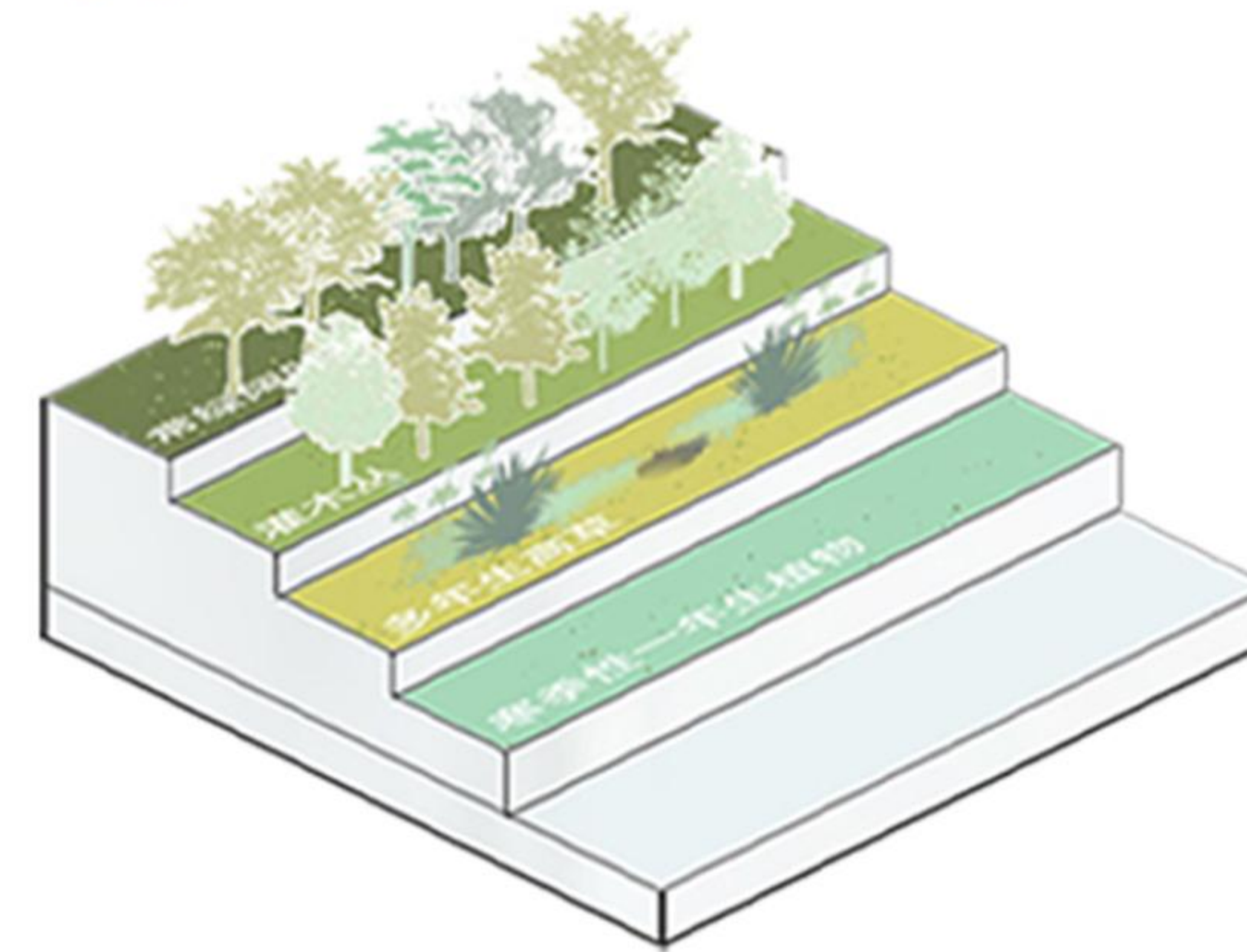
Intelligent management



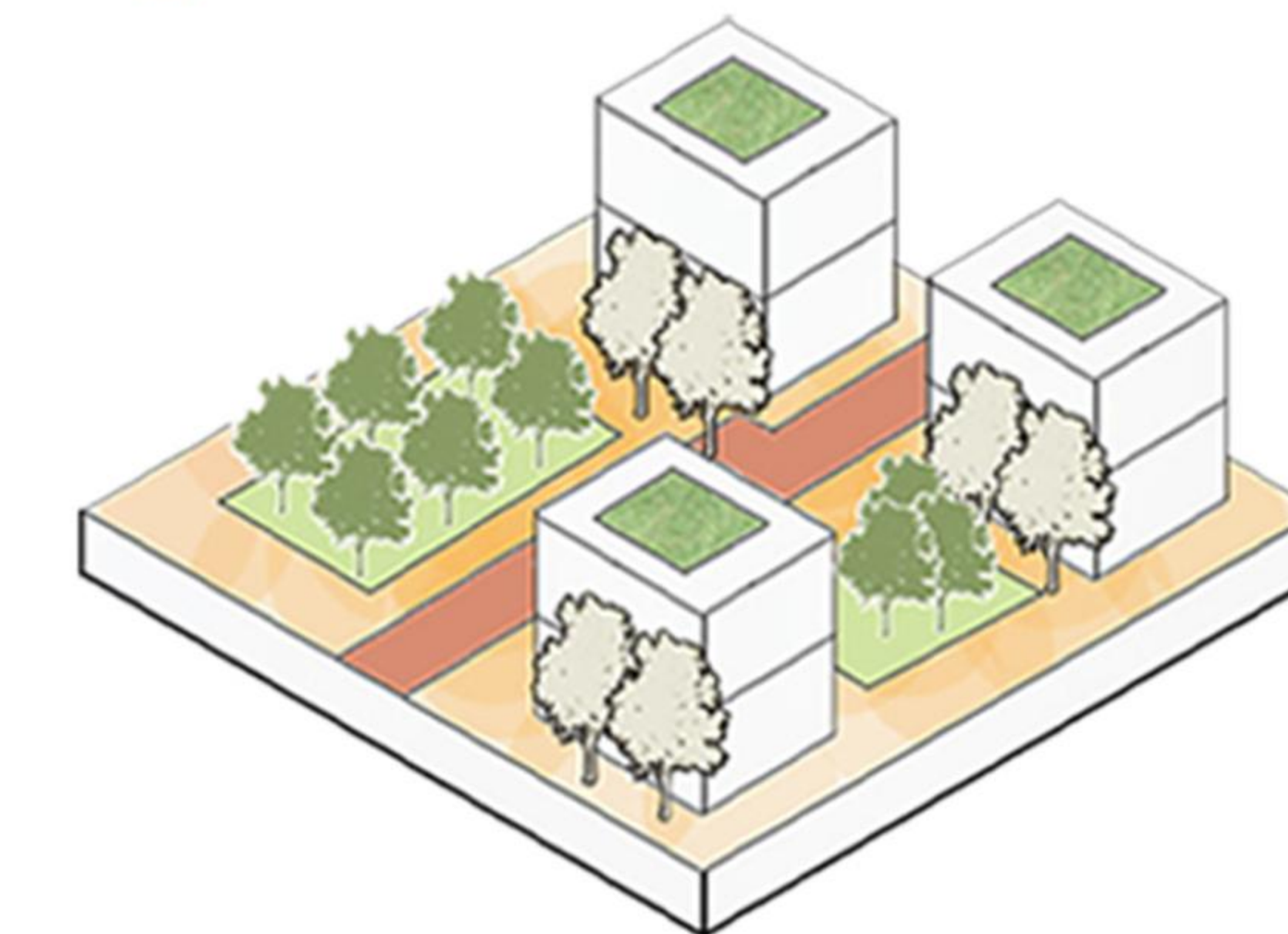
Slow traffic dominates



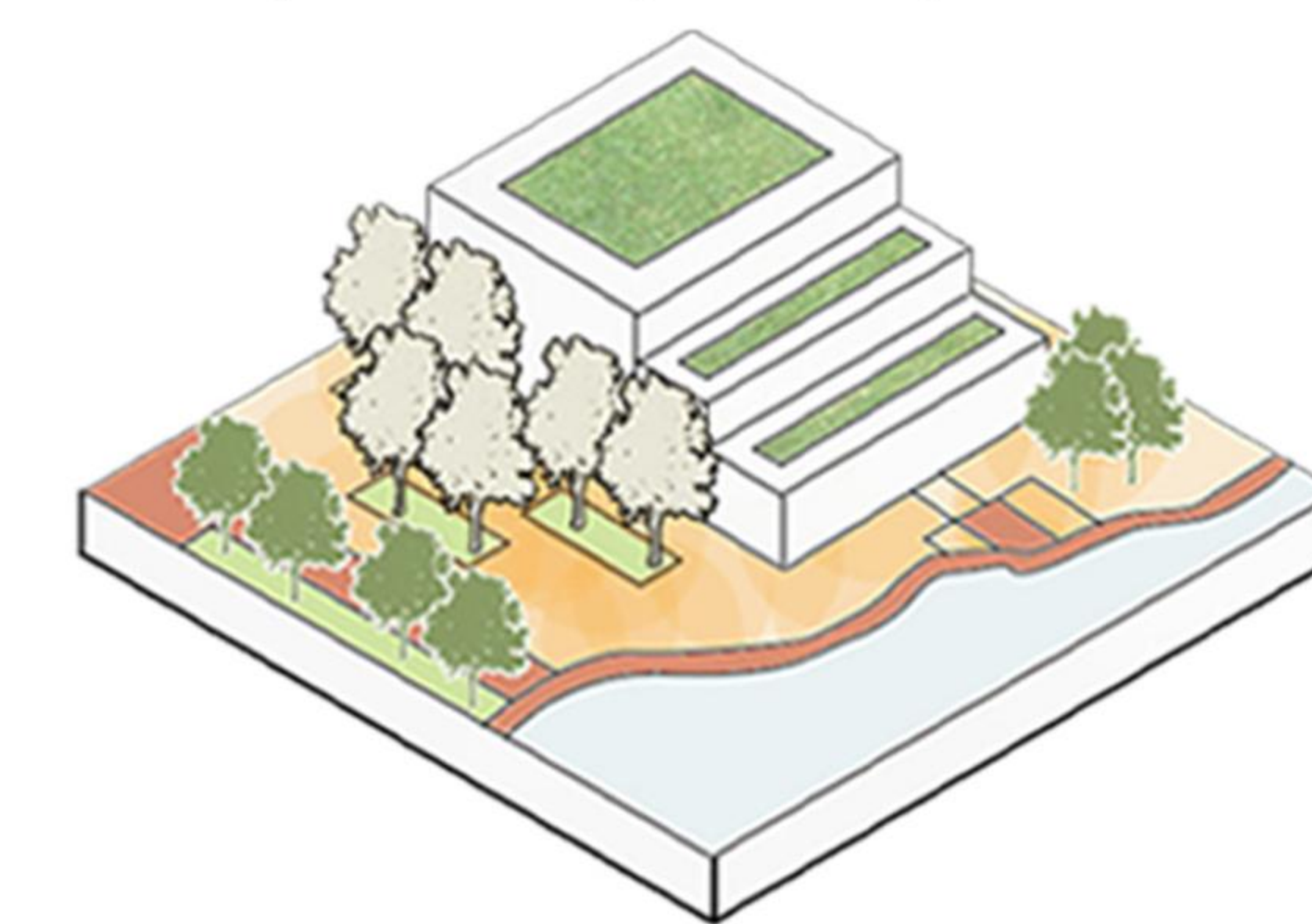
River water is drained
Equipped with three-dimensional greening



River water outsourcing



Implant open space

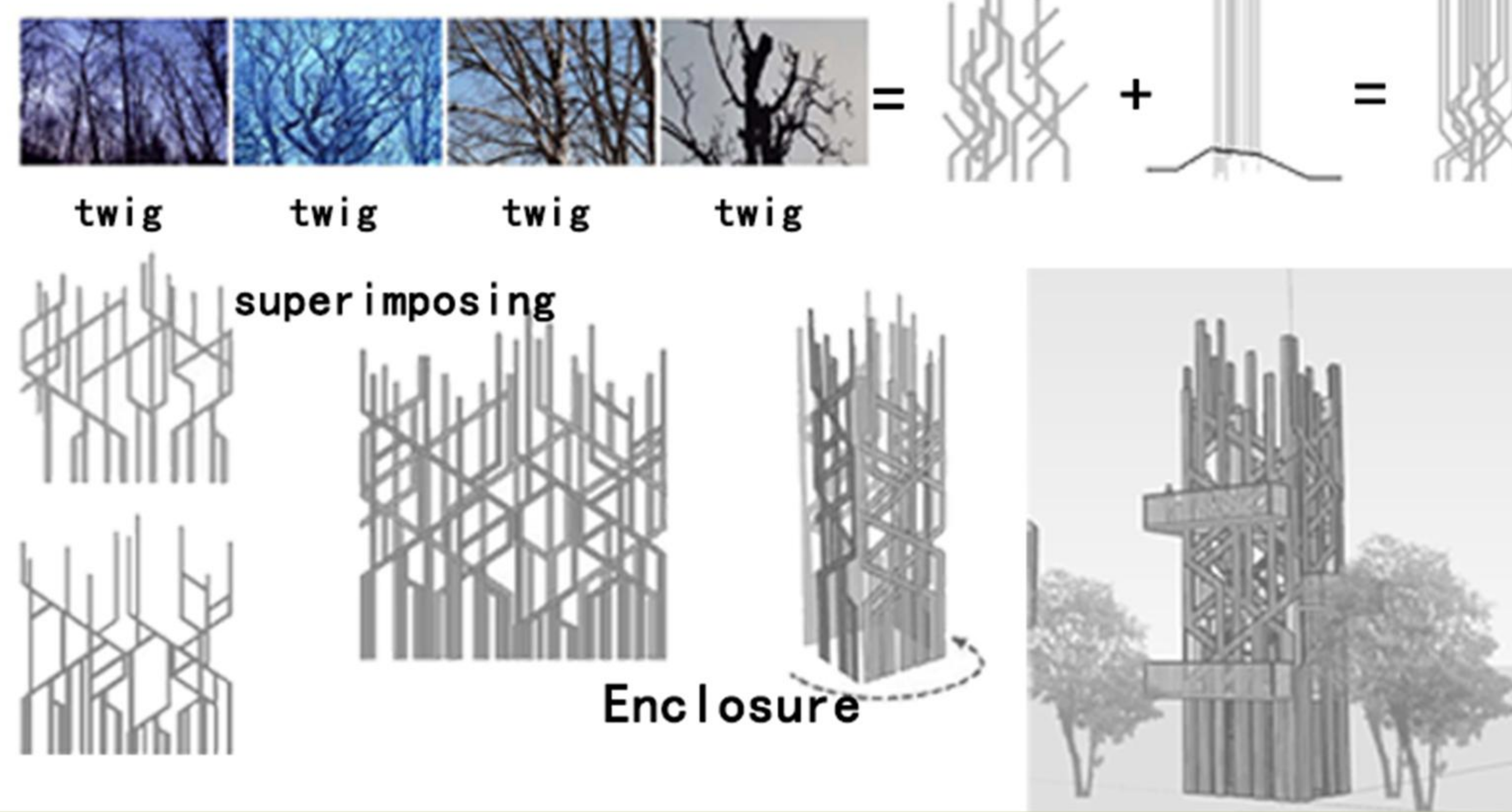


setback landscape façade

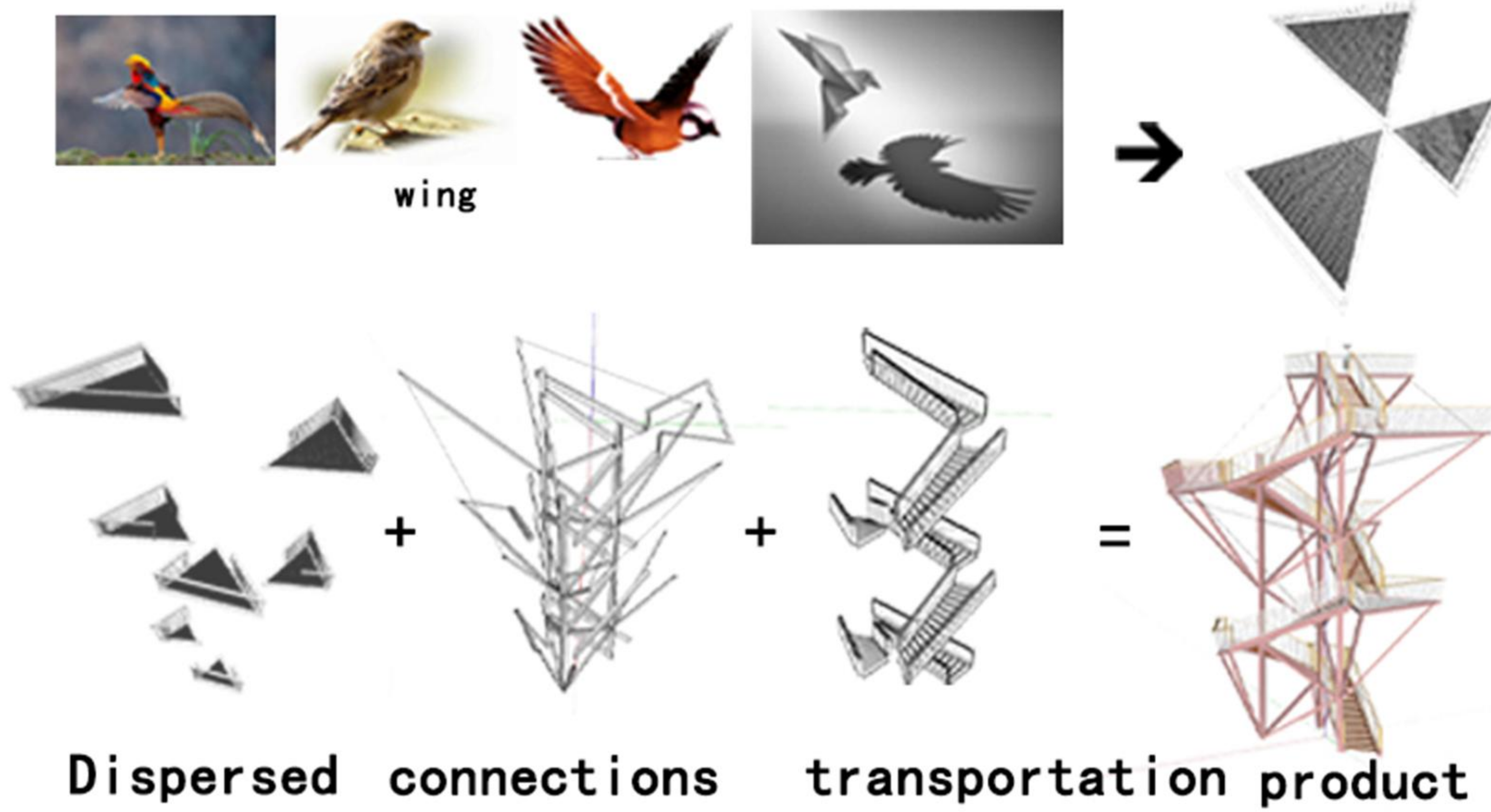


STRATEGY THREE: BUILDING BIRD WATCHING

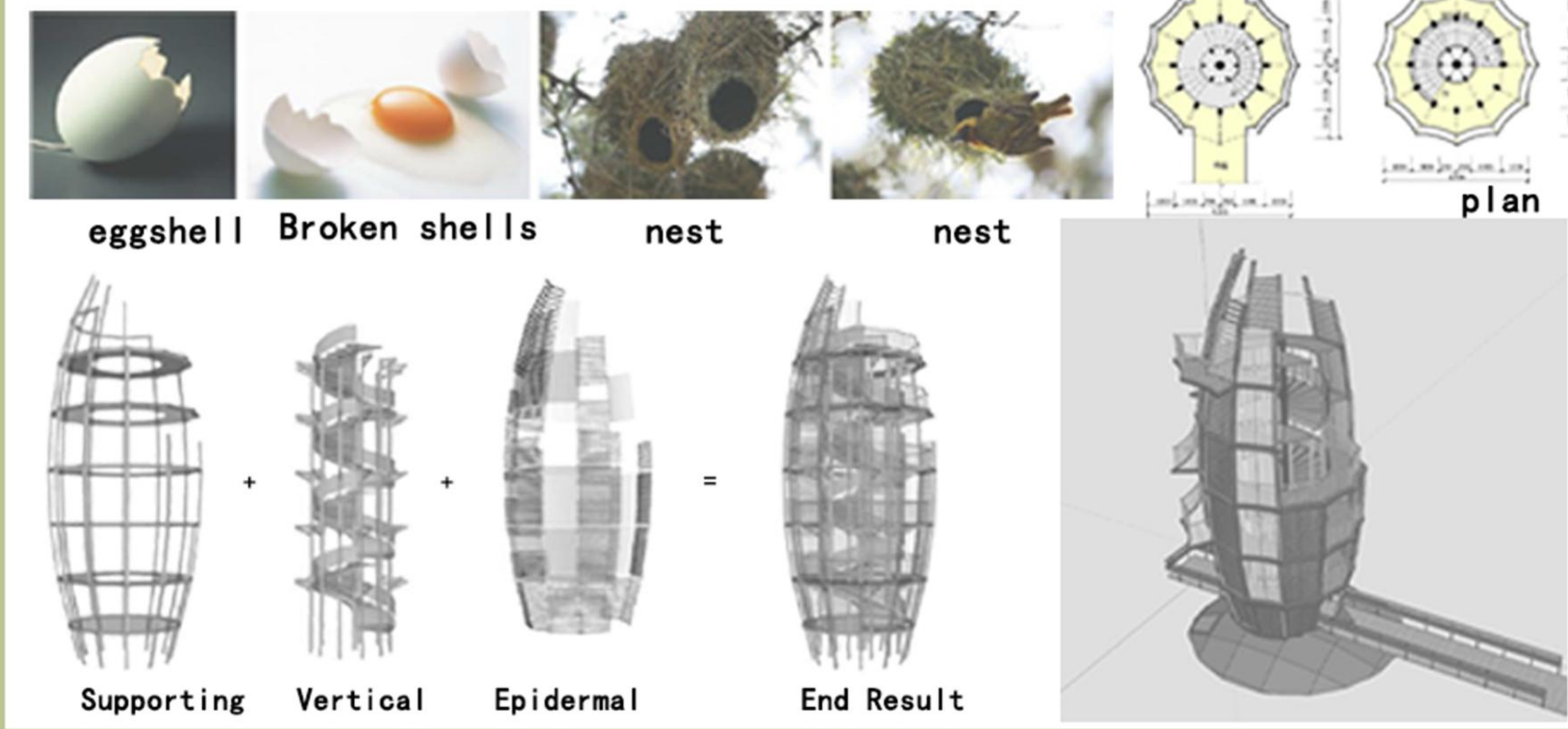
BIRDING PLATFORM EVOLUTION 1



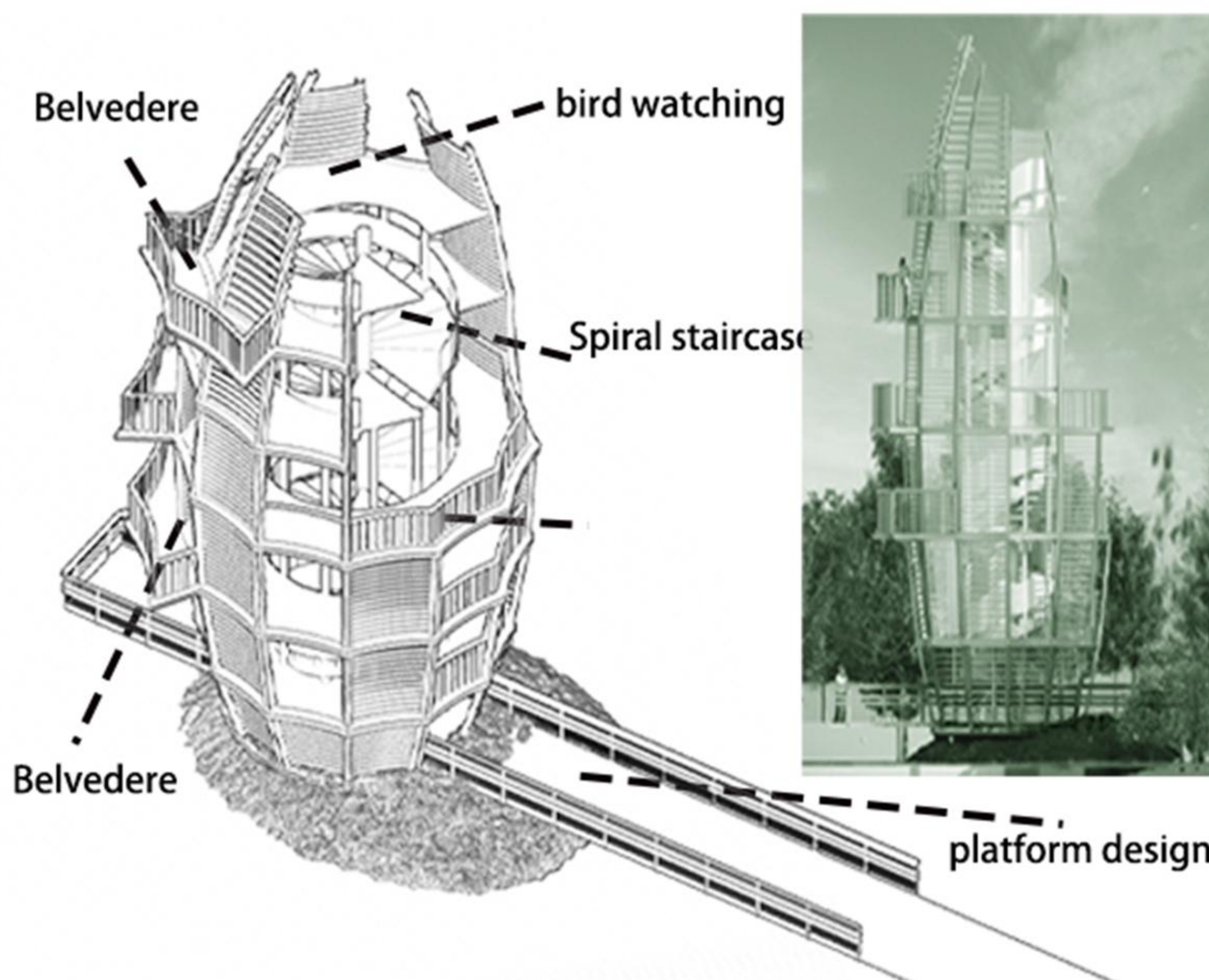
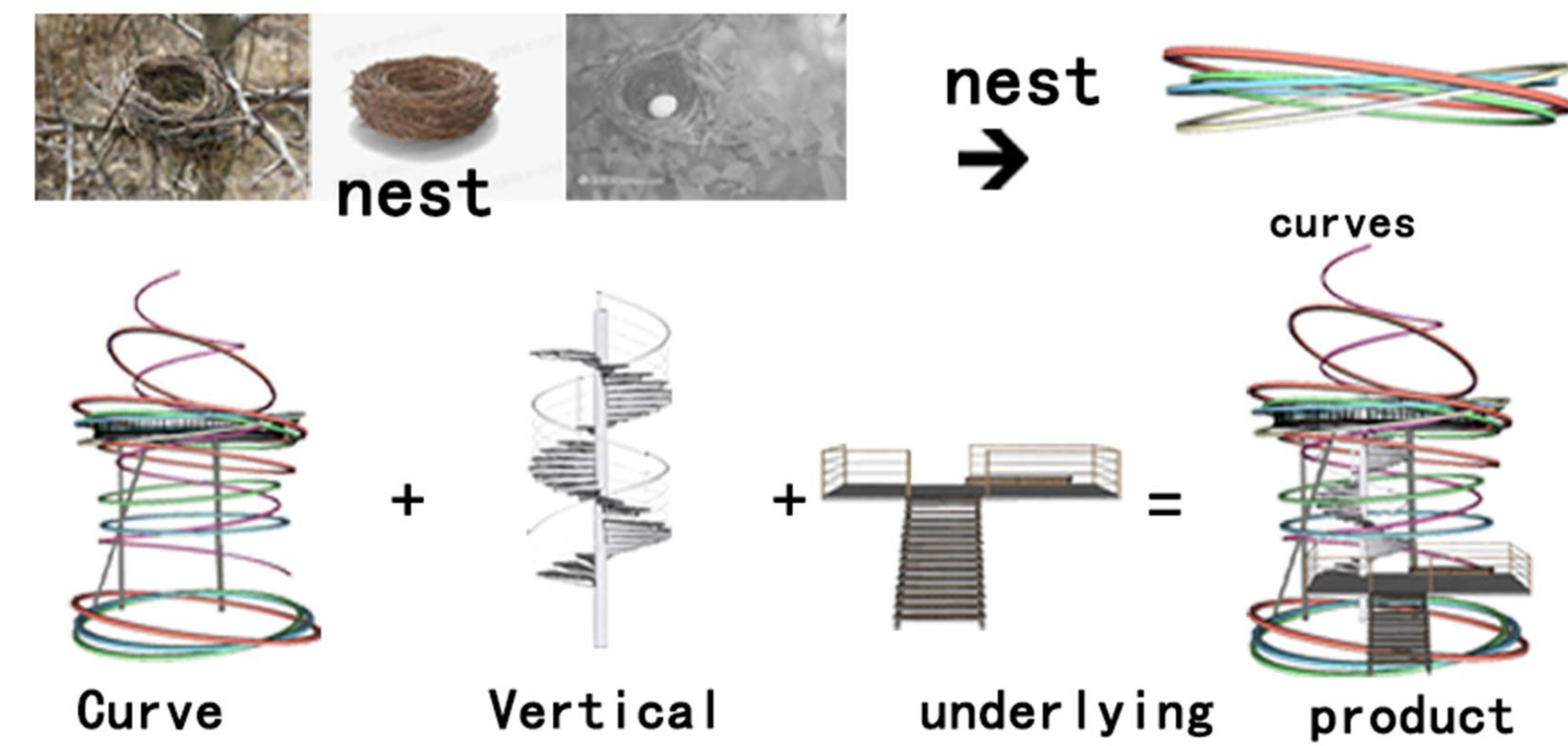
BIRDING PLATFORM EVOLUTION 3



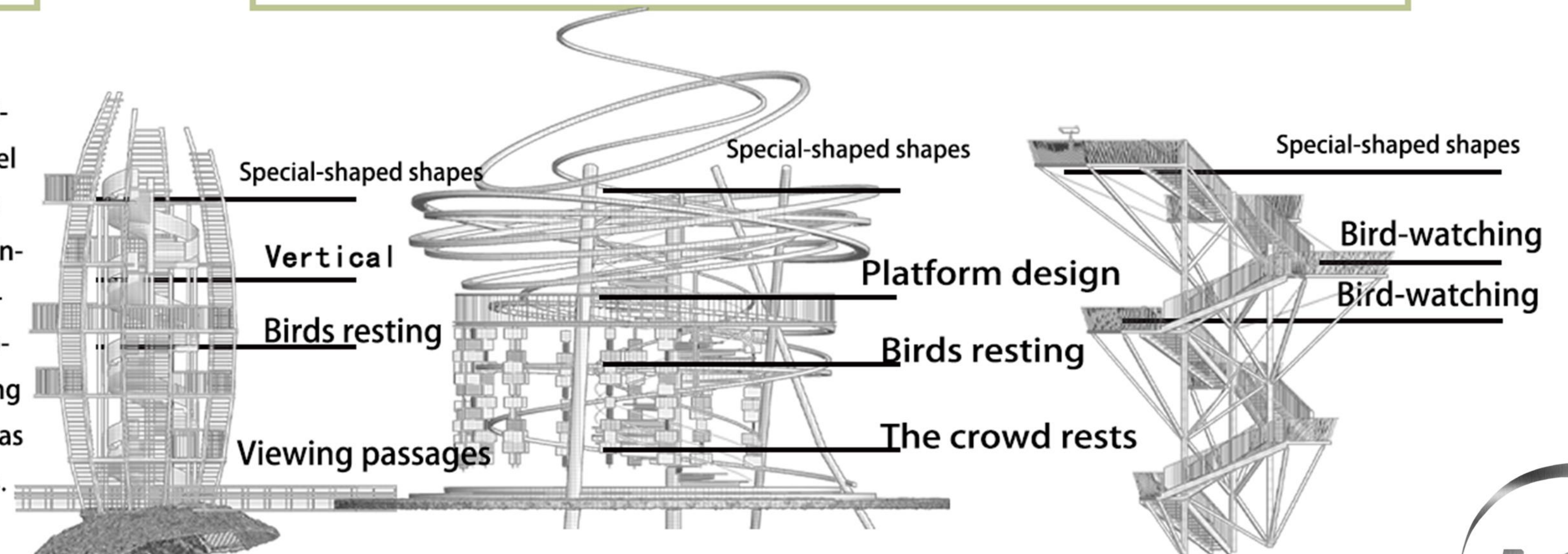
BIRDING PLATFORM EVOLUTION 2



BIRDING PLATFORM EVOLUTION 4



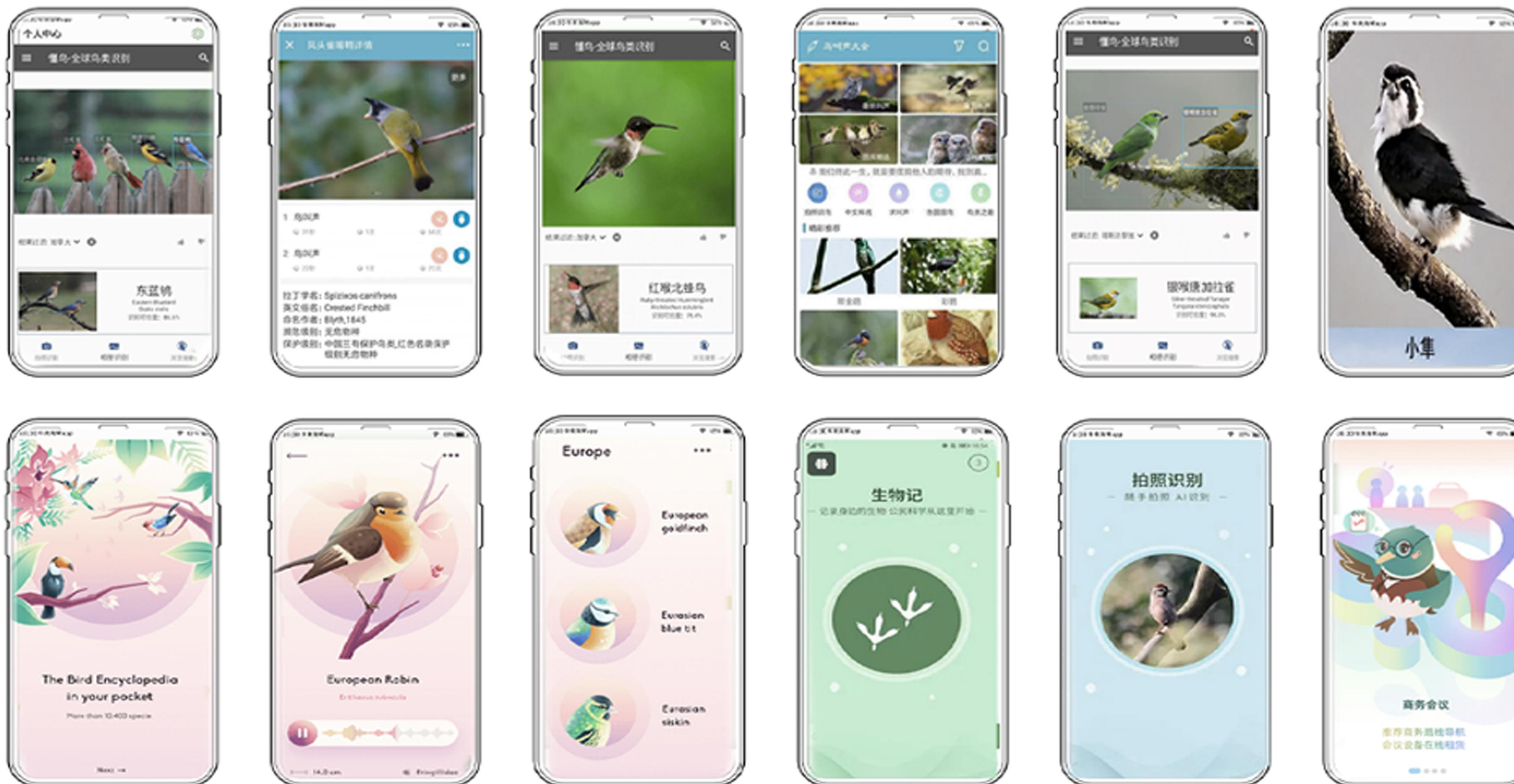
The design style of nature and ecological theme is adopted to make users feel connected to nature. Provides a guide to a variety of bird viewing locations, including maps, transportation information, best time to see, and more. Establish a complete bird database, including pictures, descriptions, distribution areas and other information of various birds.





STRATEGY DESIGN 2: SMART BIRD WATCHING APP DESIGN

INTERFACE DESIGN





STRATEGY 2: ESTABLISHING A DIVERSIFIED ECOLOGICAL ENVIRONMENT

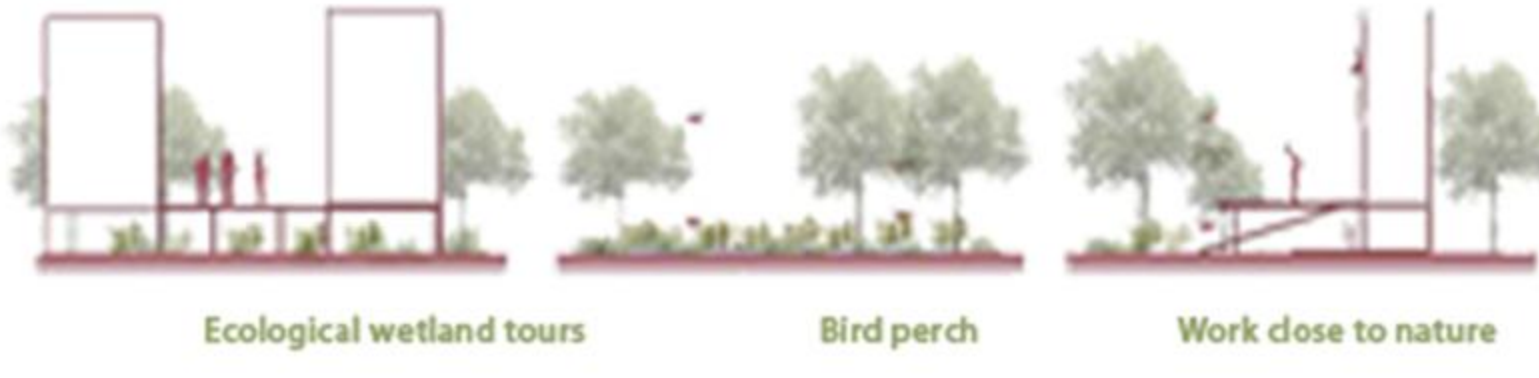
Wedge-shaped green spaces are embedded in the river

The lack of green space in the residential group and the extremely weak connection with the river not only meet the residents' demand for ecological green space, but also provide more ecological space for human-bird interaction and more urban habitat for birds.



Constructed wetland design

In order to attract more migratory birds to settle in the city, a large area of wetland space is arranged in the base to provide food and resting grounds for migratory birds, and at the same time, citizens can have more green activity space in the city and learn about birds.



Bird protection along the riverfront

In addition to providing recreation and rest activities for residents, it can also serve as a center for disseminating bird knowledge and increasing public participation and understanding of bird conservation.



Arrange the ecological covered bridge

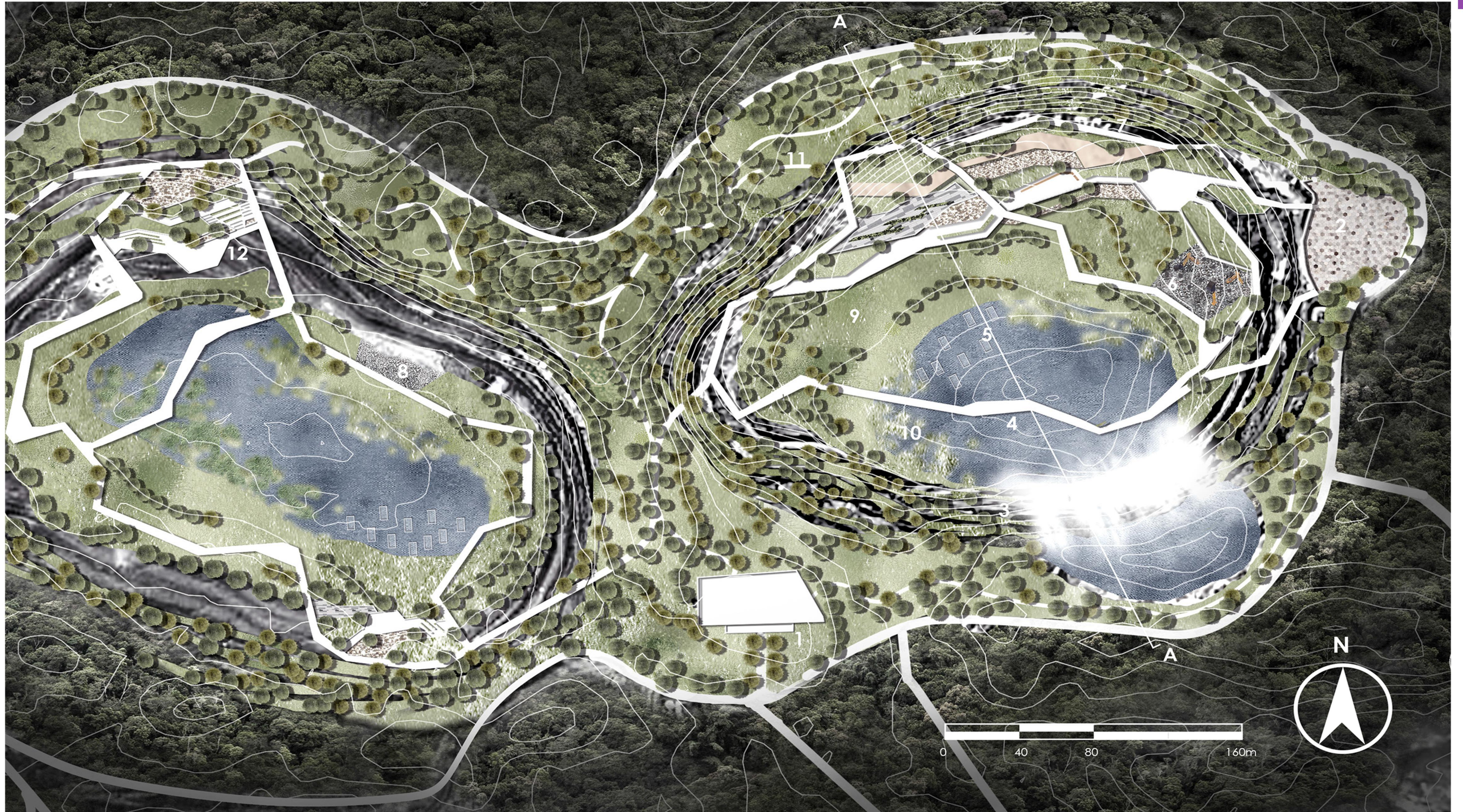
The integration of green patches in the city plays a crucial role in the urban ecology, and the ecological corridor bridge connects the central park and the wetland in the base, so that the ecological space can be integrated, so that insects



Set up a bird-watching platform

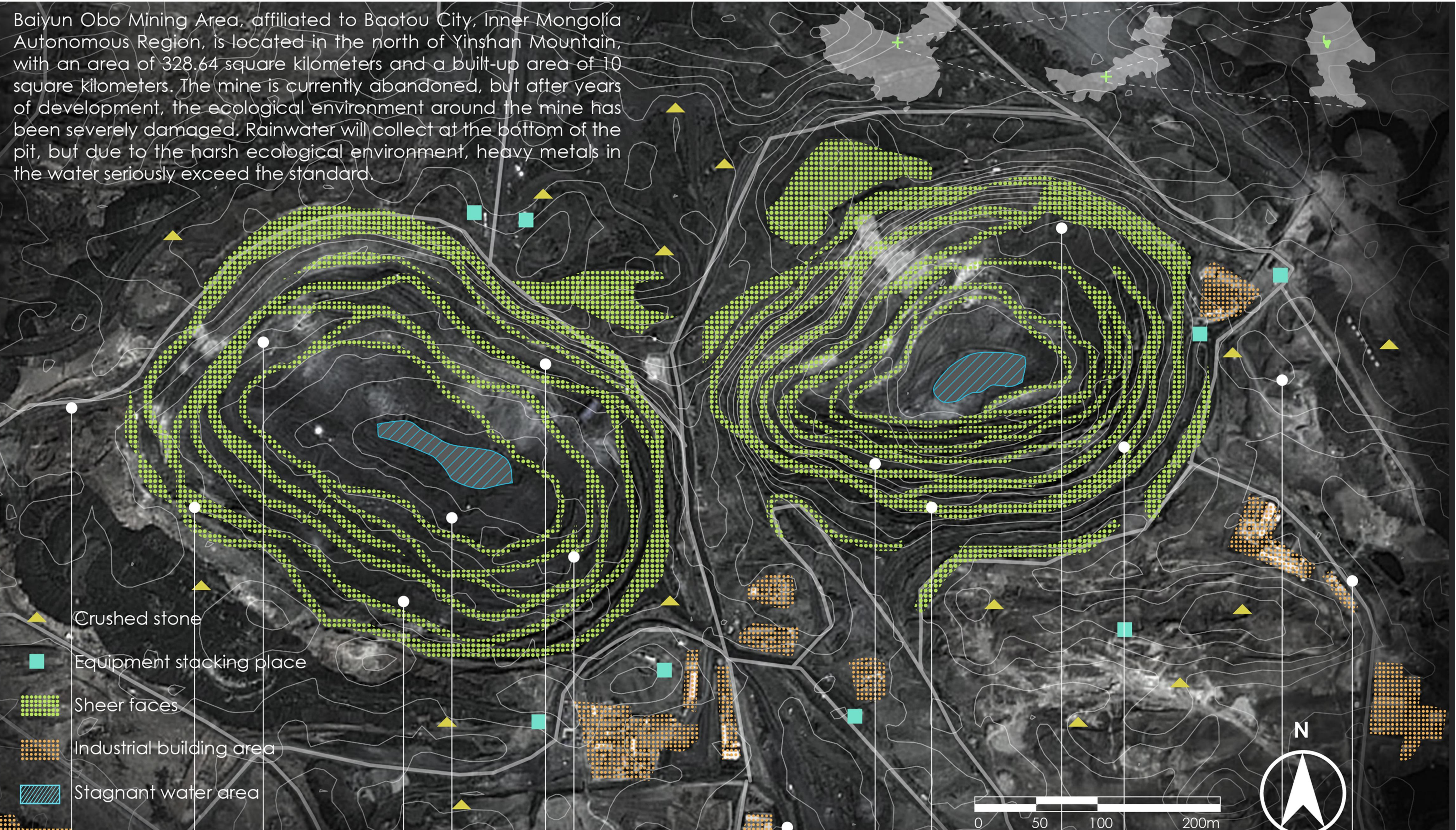
The landscape resources are excellent, and it is also a high incidence point of birds, so a bird-watching platform is arranged here to allow the public to have a better check-in point and improve the public's awareness of birds.





THE PROJECT ADOPTS TECHNOLOGIES SUCH AS PHYTOREMEDIATION FOR SOIL AND MUSSEL-BASED WATER PURIFICATION TO FORM A COMPLETE ECOLOGICAL CHAIN. WITH TECHNOLOGICAL INNOVATION, IT REALIZES THE INTEGRATION OF INDUSTRIAL HERITAGE AND ECOLOGICAL LANDSCAPE THROUGH DESIGNS LIKE ARTISTIC INSTALLATIONS OF ABANDONED EQUIPMENT AND PRESERVATION OF INDUSTRIAL TEXTURE ON ROCK WALLS. AT THE LANDSCAPE LEVEL, THE DESIGN LOGIC OF "INDUSTRIAL SKELETON + ECOLOGICAL SKIN" TRANSFORMS THE MINE PIT FROM AN ECOLOGICAL LIABILITY INTO A PUBLIC SPACE COMBINING EDUCATIONAL AND RECREATIONAL FUNCTIONS.

Baiyun Obo Mining Area, affiliated to Baotou City, Inner Mongolia Autonomous Region, is located in the north of Yinshan Mountain, with an area of 328.64 square kilometers and a built-up area of 10 square kilometers. The mine is currently abandoned, but after years of development, the ecological environment around the mine has been severely damaged. Rainwater will collect at the bottom of the pit, but due to the harsh ecological environment, heavy metals in the water seriously exceed the standard.



Country/City	BEIJING, CHINA
University / School	BEIJING JIAOTONG UNIVERSITY
Academic year	FIRST-YEAR MASTER'S STUDENT
Title of the project	"GREEN VEIN REGENERATION" ECOLOGICAL RESTORATION LANDSCAPE DESIGN FOR MINE PIT
Authors	SUN SHAOQI ; LIU HENG

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Written statement, short description of the project in English, no more than 250 words

THIS DESIGN TAKES "ECOLOGICAL RESTORATION AND ACTIVATION OF INDUSTRIAL HERITAGE" AS THE CORE, AND IMPLEMENTS HIERARCHICAL TRANSFORMATION FOR THE FOUR-LEVEL SLOPE TERRAIN OF THE MINE PIT. ACCORDING TO THE SLOPE, THE TERRAIN IN THE SITE CAN BE ROUGHLY DIVIDED INTO FOUR TYPES. ACCORDING TO THE CHARACTERISTICS OF EACH SLOPE, DIFFERENT LANDSCAPE TYPES CAN BE CREATED, SUCH AS CLIFF PLANK ROADS, WATERFRONT PLATFORMS, TERRACE LANDSCAPES, ETC., SO AS TO RE-ENERGIZE THE SITE. THE DESIGN INTEGRATES ECOLOGICAL RESTORATION, POPULAR SCIENCE EDUCATION AND LEISURE FUNCTIONS, MAKING THE ABANDONED MINE PIT A MODEL FOR THE REGENERATION OF INDUSTRIAL SITES.

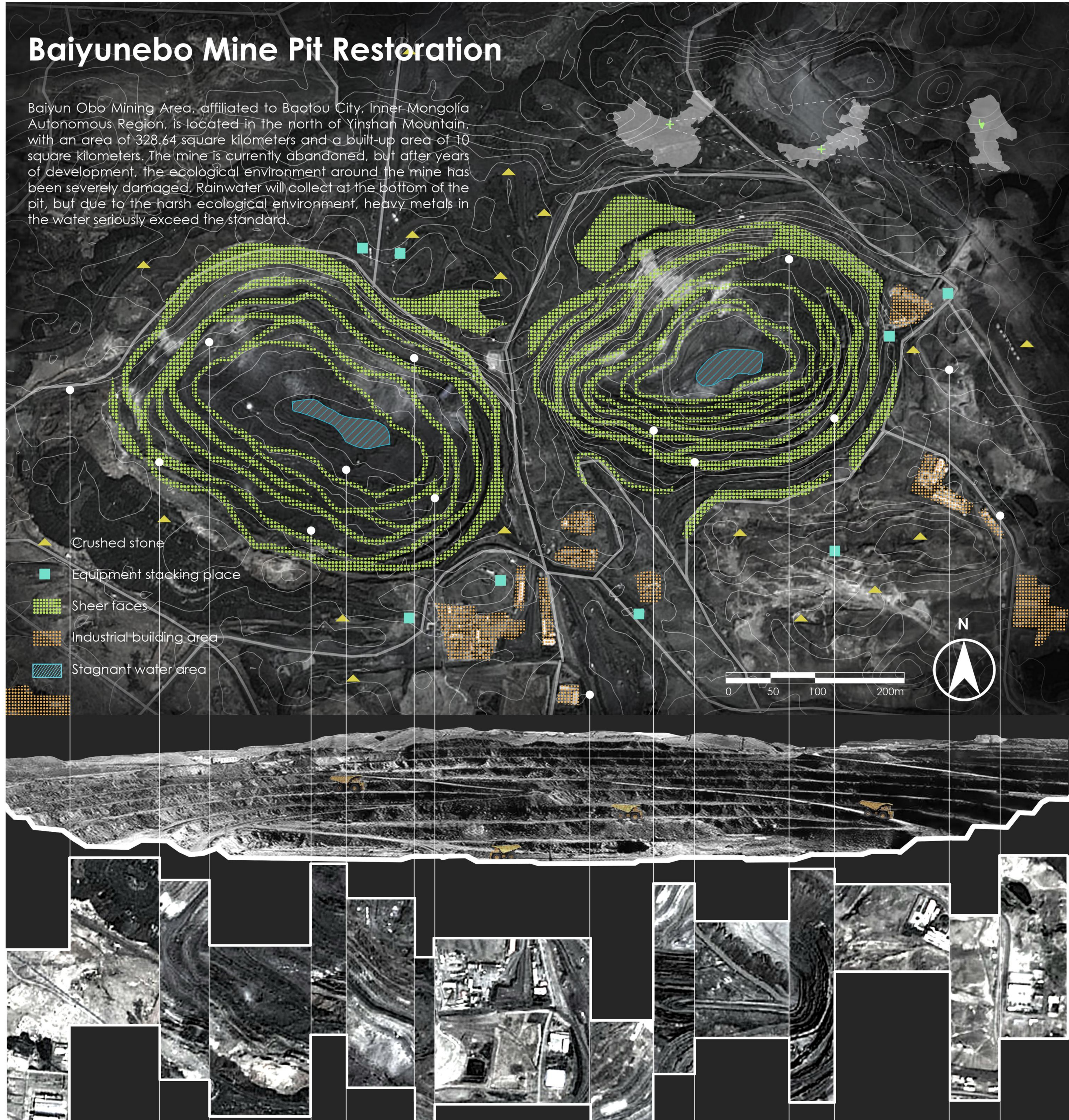
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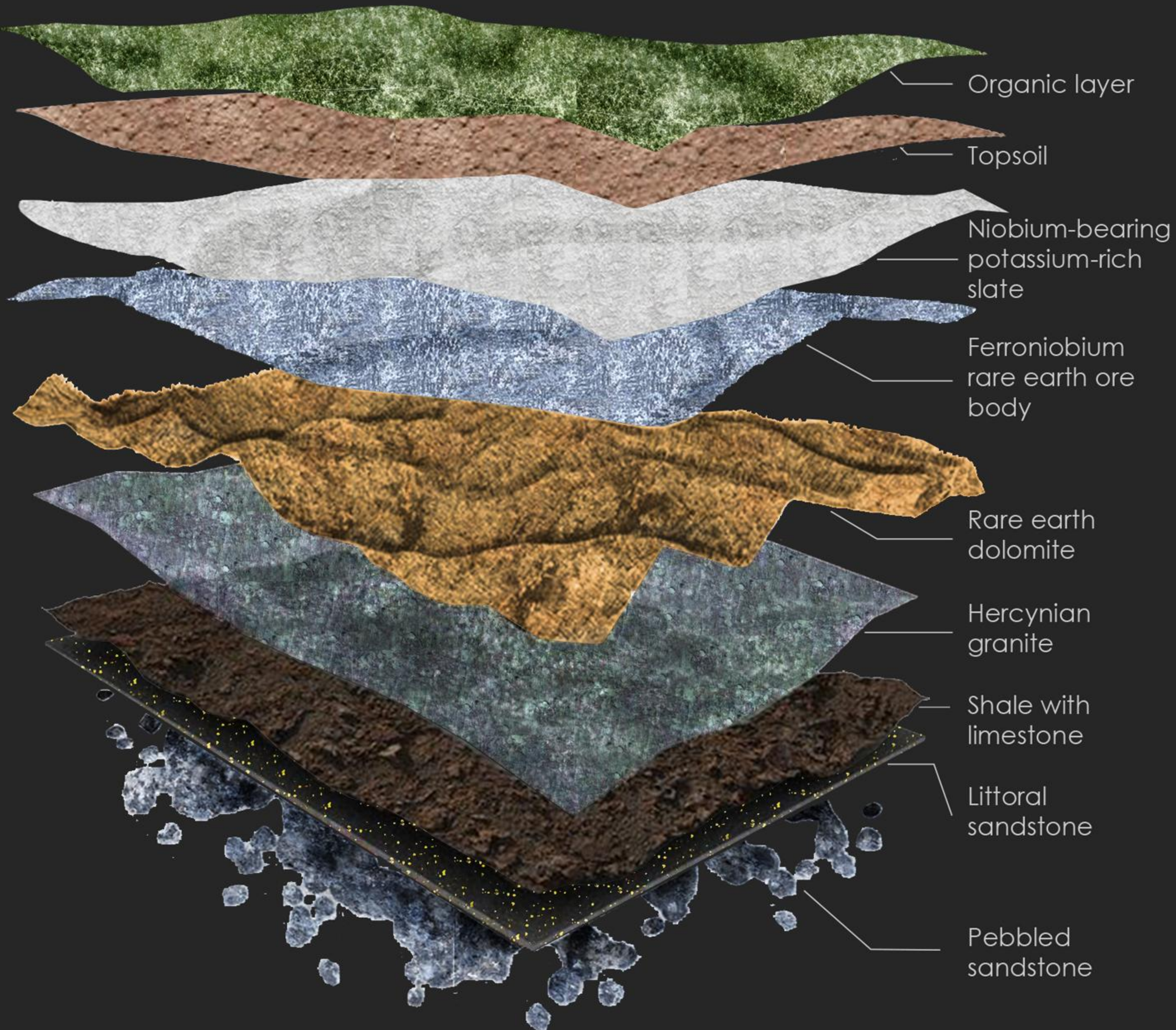
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Baiyunebo Mine Pit Restoration

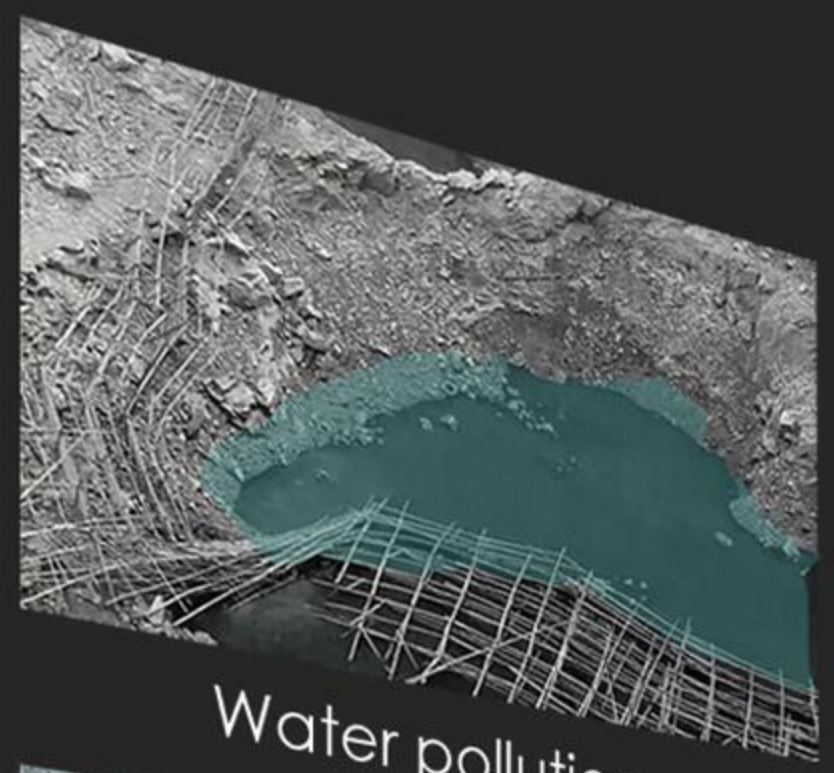
Baiyun Obo Mining Area, affiliated to Baotou City, Inner Mongolia Autonomous Region, is located in the north of Yinshan Mountain, with an area of 328.64 square kilometers and a built-up area of 10 square kilometers. The mine is currently abandoned, but after years of development, the ecological environment around the mine has been severely damaged. Rainwater will collect at the bottom of the pit, but due to the harsh ecological environment, heavy metals in the water seriously exceed the standard.



Geological Analysis



Existing Problems



Water pollution



Gravel rolling



Ecological damage



Garbage swarms

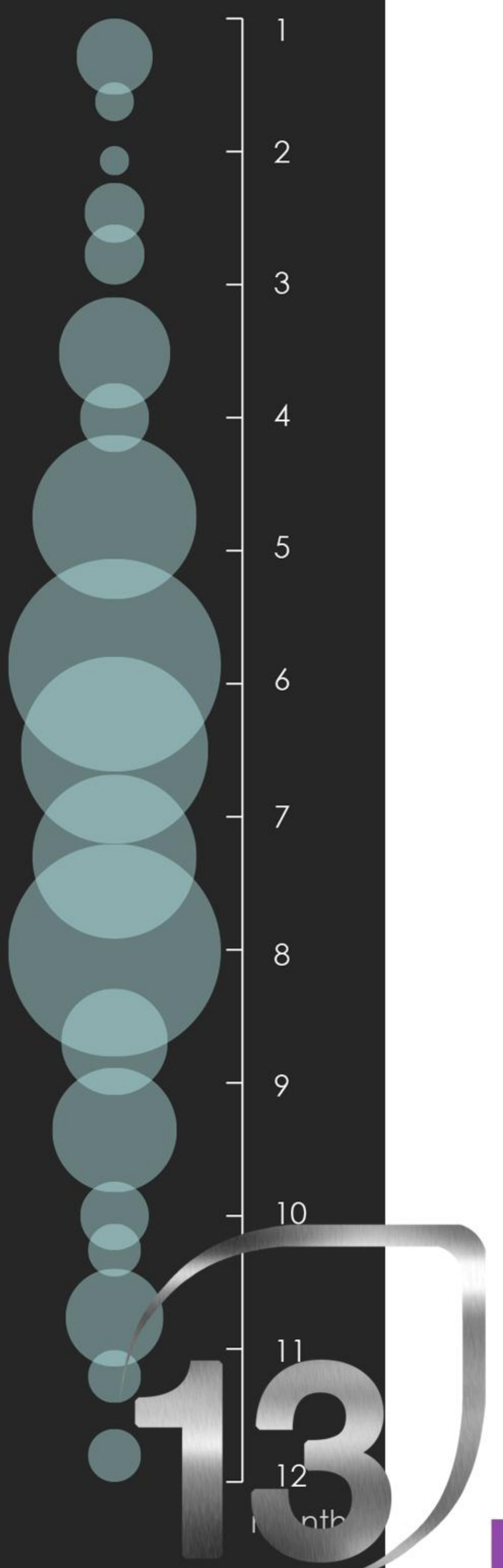
Rainfall Analysis

Rainwater accumulates at the bottom of the pit, and the water contains heavy metal elements that cause fish to mutate and are harmful to surrounding birds.

Due to long-term excavation, gravel often rolls down the rock wall, endangering people's lives.

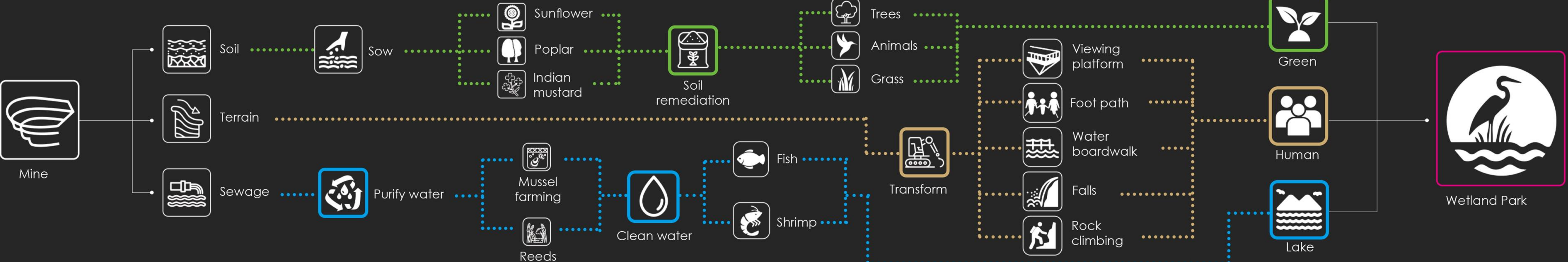
The long-term mine development has seriously damaged the ecology of the area, and the environment without green plants is very dusty.

There are very few people living around the mining area, so a lot of garbage is piled up, and no one cleans it, making the ecological environment very bad.



Strategy

Framwork

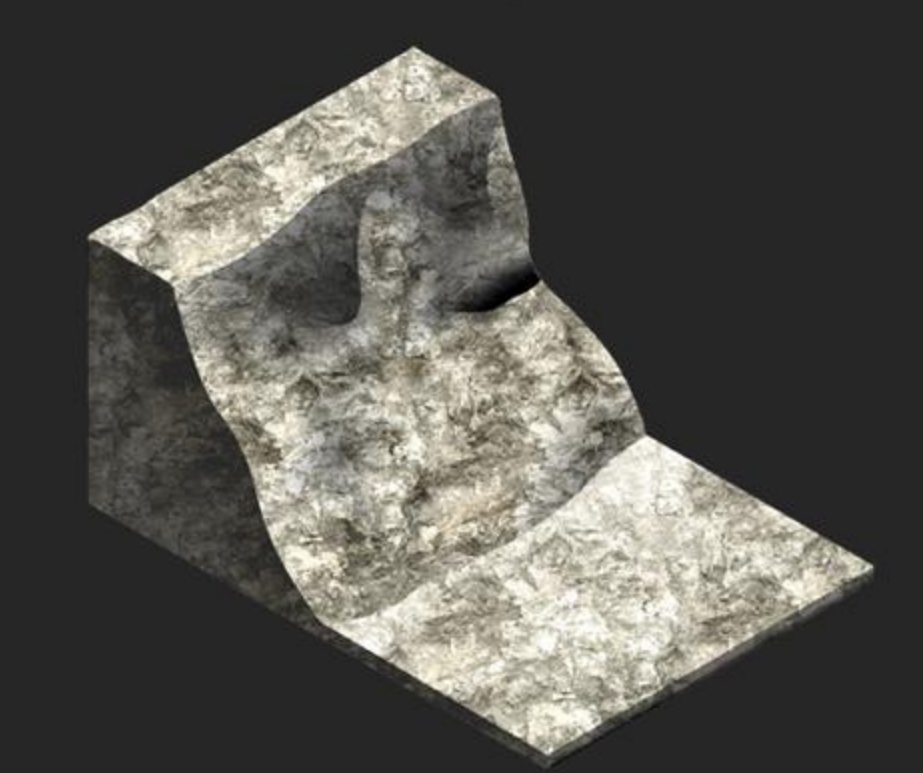


The strategy of pit restoration is mainly reflected in three aspects, namely soil restoration, water purification and human activities. Soil restoration is done mainly by planting Indian mustard, sunflower, etc. Purification of water sources is mainly done by cultivating river mussels, grass carp, and planting reeds and cattail grass. Human activities are mainly completed by building plank roads, lawns, and commemorative landscapes.

Site Status

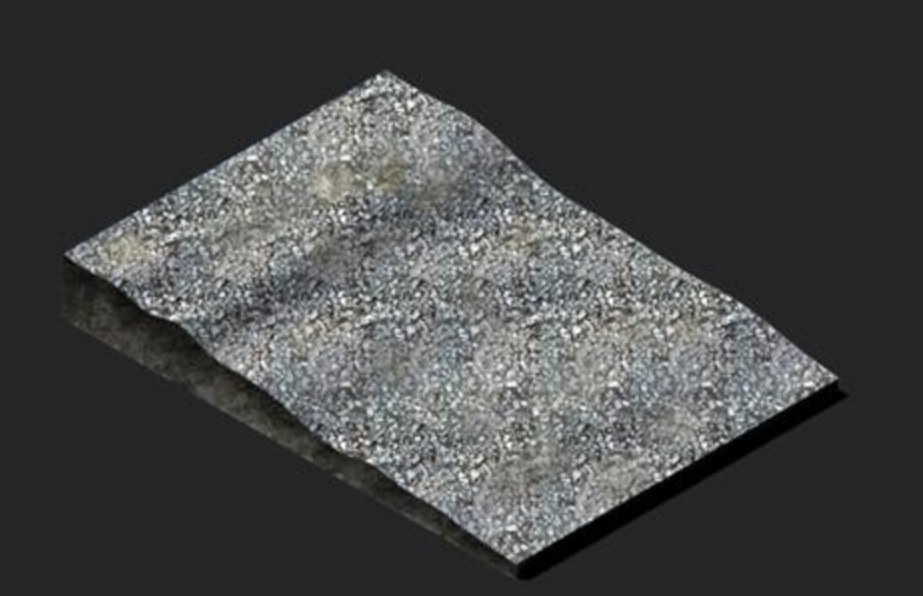
After the mine is developed, there are currently four types of terrain, namely cliffs with a slope greater than 45 degrees, steep slopes of 15-45 degrees, gentle slopes of 5-15 degrees, and flat lands of 0-5 degrees.

Terrain 1 Steep



The first type of terrain is a cliff with a slope greater than 45 degrees, which is widely located in the middle and upper walls of the pit.

Terrain 3 Gentle



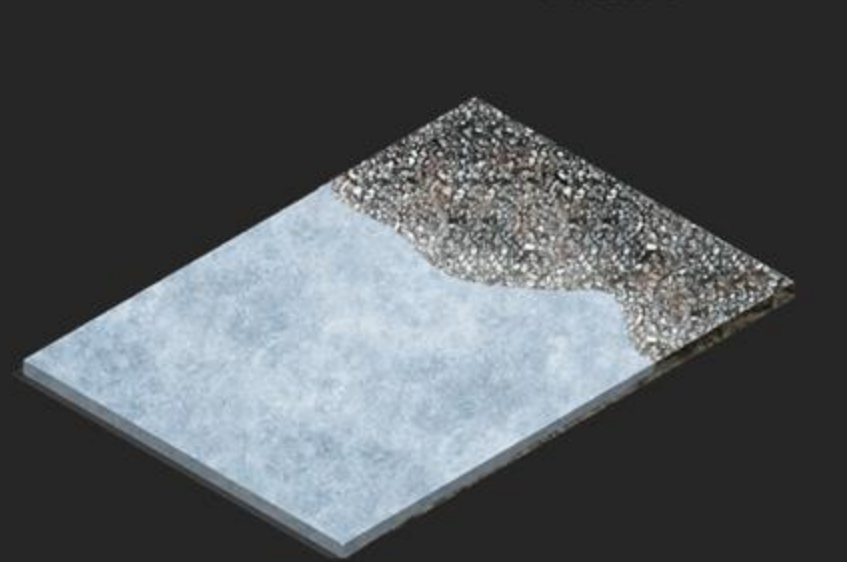
The third type of landform is a gentle slope with a slope of 5-15 degrees, which is basically located at the bottom of the pit, and partly located at the waterfront.

Terrain 2 Medium



The second type of terrain is a steep slope with a slope of 15-45 degrees, which is basically located in the middle and lower part of the pit.

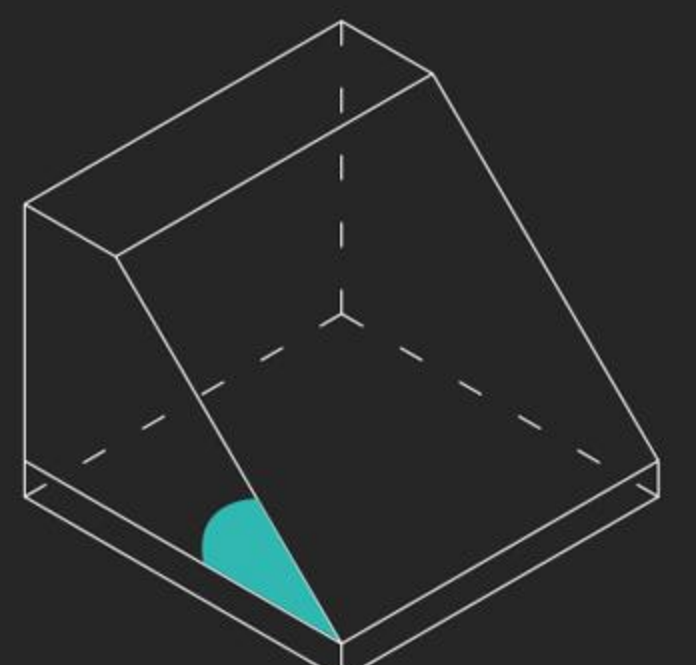
Terrain 4 Plain



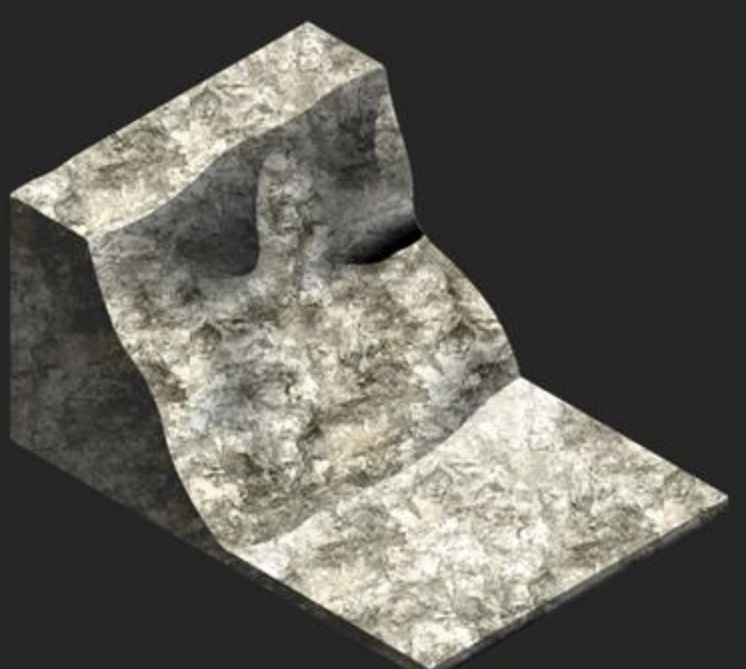
The fourth kind of landform is flat land with a slope of 0-5 degrees. This landform is also basically located at the bottom of the mine pit and is the place where the mine pit accumulates water.

Operation

Terrain 1 Steep

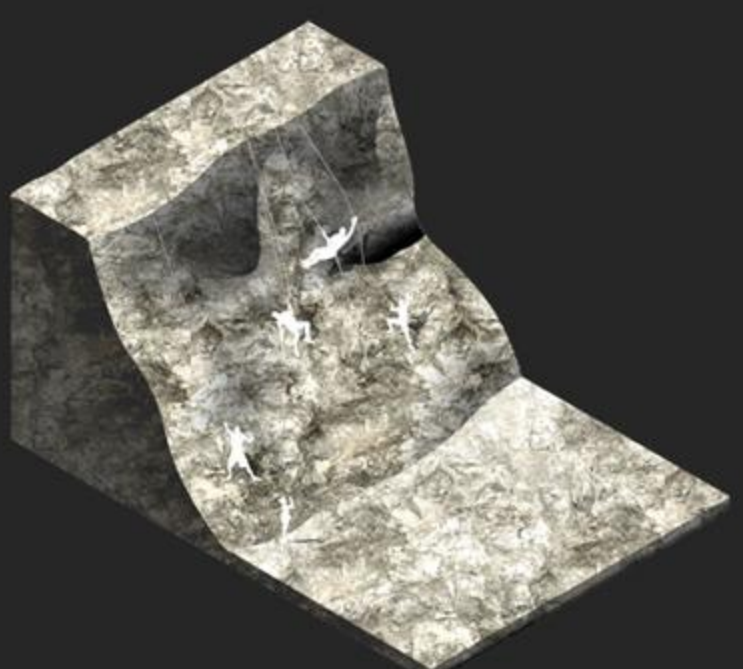


Steep (>45°)



Cliff

After development, the inner walls of the pit have many very steep terrains, similar to cliffs



Rock climbing

The rock walls left by mining provide venues for rock climbers



Cliff path

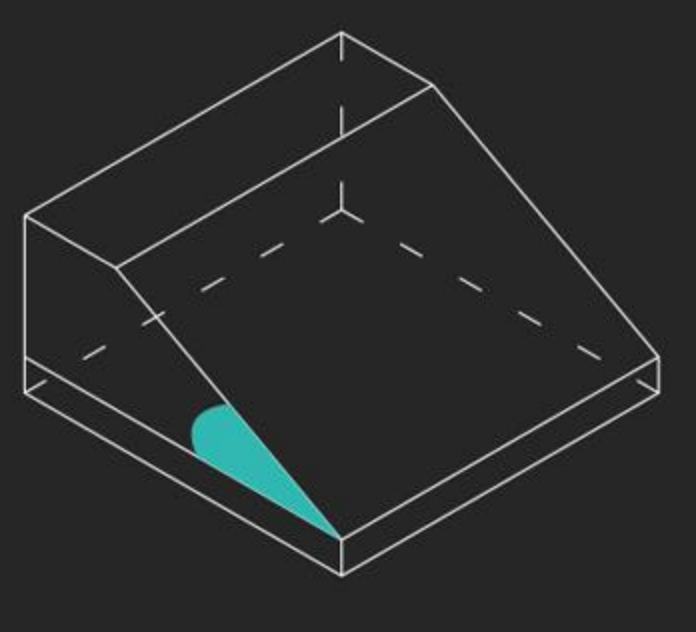
A walkway is dug on the cliff to allow tourists to better enjoy the scenery



Waterfall

In part of the pit, the drop of the cliff can be used as a waterfall landscape

Terrain 2 Medium

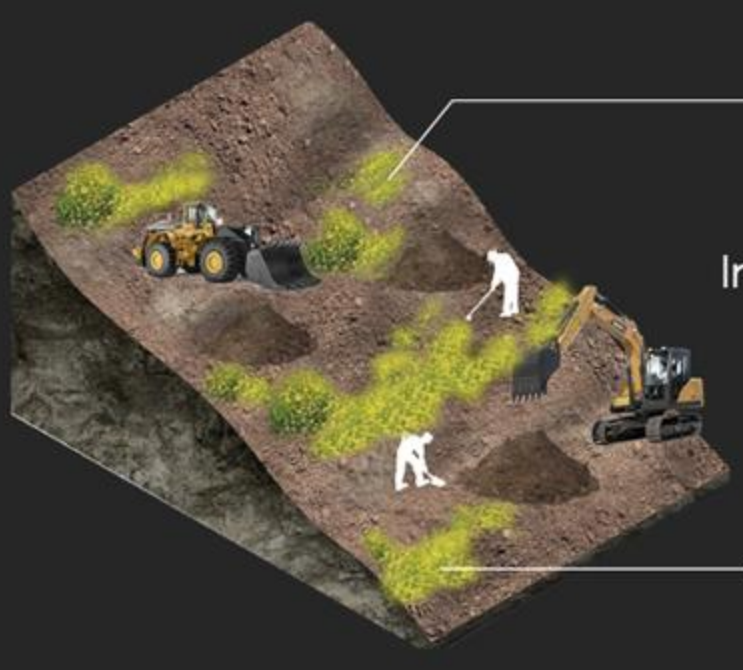


Medium (15° - 45°)



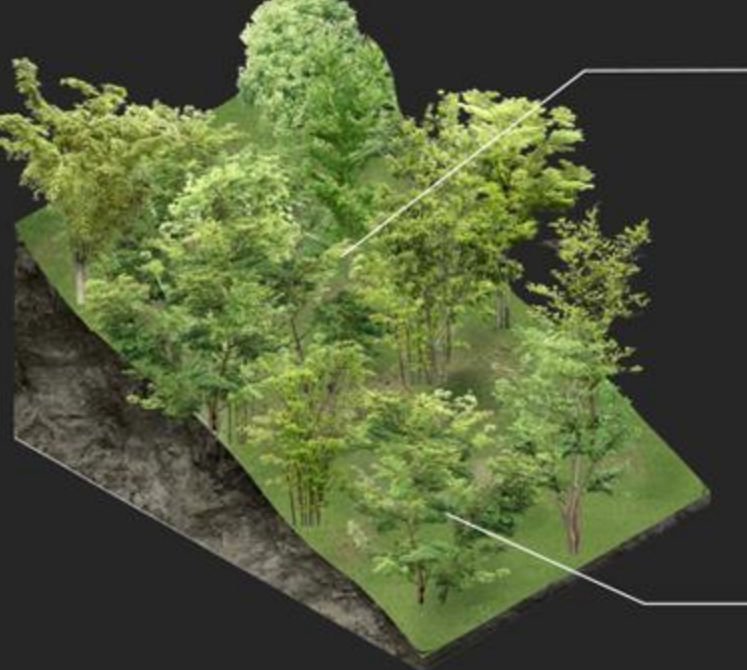
Drop-off

Steep slopes in parts of the middle and bottom of the pit



Soil remediation

Soil remediation using machines and artificial planting



Forest

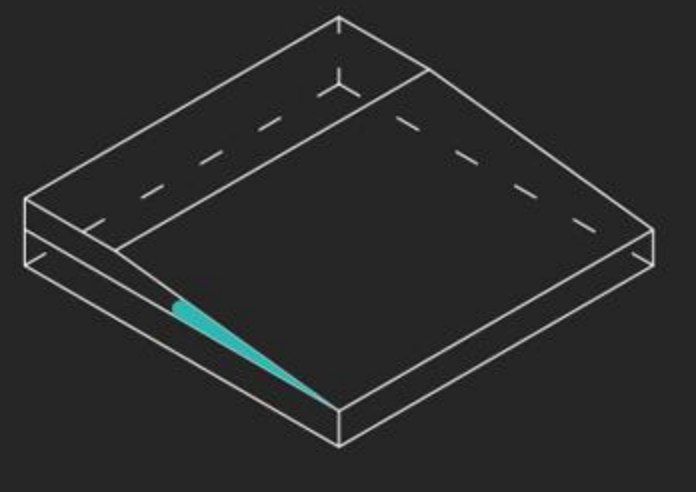
Stabilize the soil and prevent soil erosion by planting trees



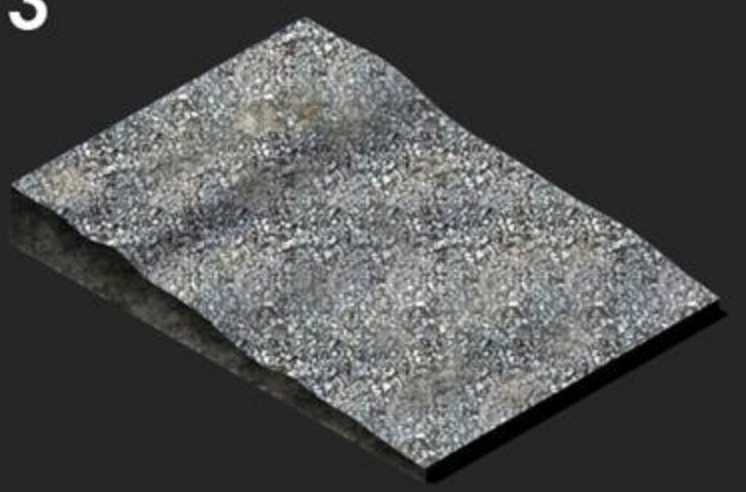
Terrace landscape

Steep slope terrain can be transformed into a layered terraced landscape

Terrain 3 Gentle

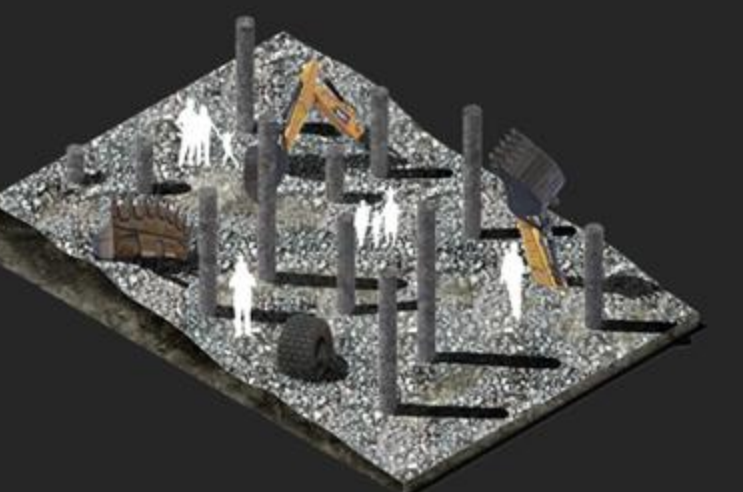


Gentle (5° - 15°)



Slope

There are many gentle slopes along the waterfront at the bottom of the pit



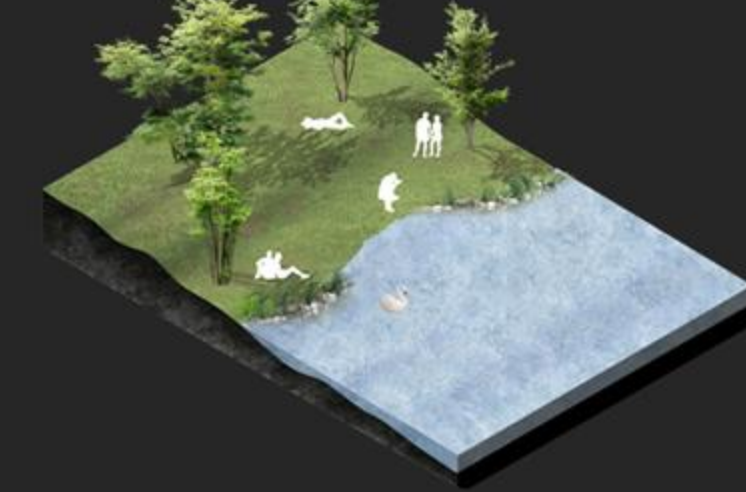
Site memory

Use abandoned water pipes and mechanical parts as a memorial landscape in the site.



Boulevard

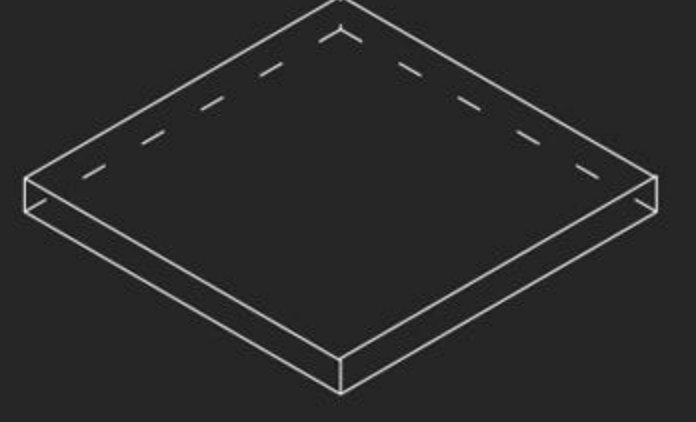
Build meandering tree-lined paths in gently sloping terrain



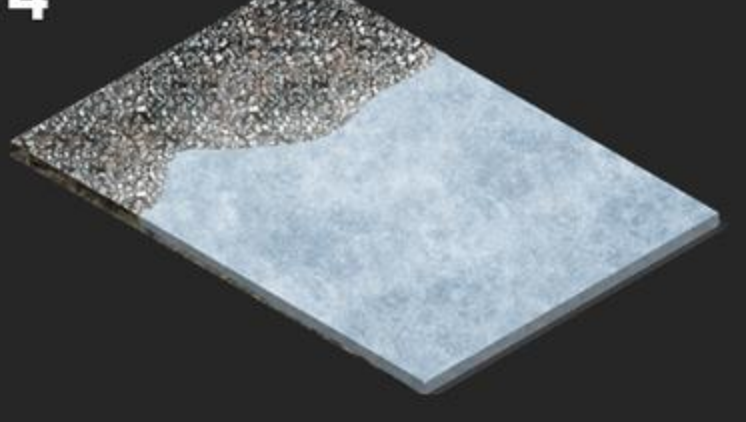
Water space

The waterfront green space provides a leisure space for people to lie down and rest

Terrain 4 Plain

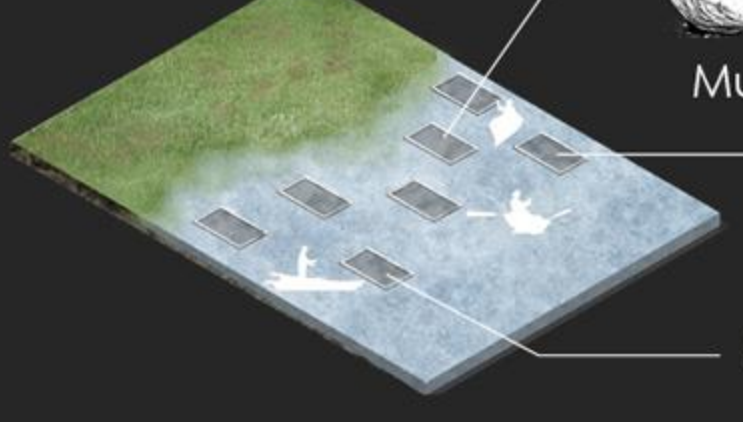


Gentle (0° - 5°)



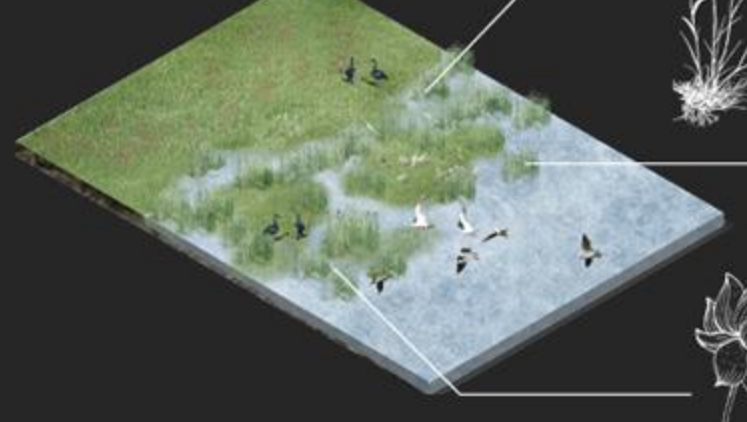
Flat

The terrain at the bottom of the pit is basically flat, and rainwater collects here to form small lakes



Aquaculture

The mine water contains heavy metals, and mussels and fish can be cultivated to purify the water quality



Aquatic planting

Reeds, lotus and other plants can be planted in the waterfront wetlands to purify water and create landscapes



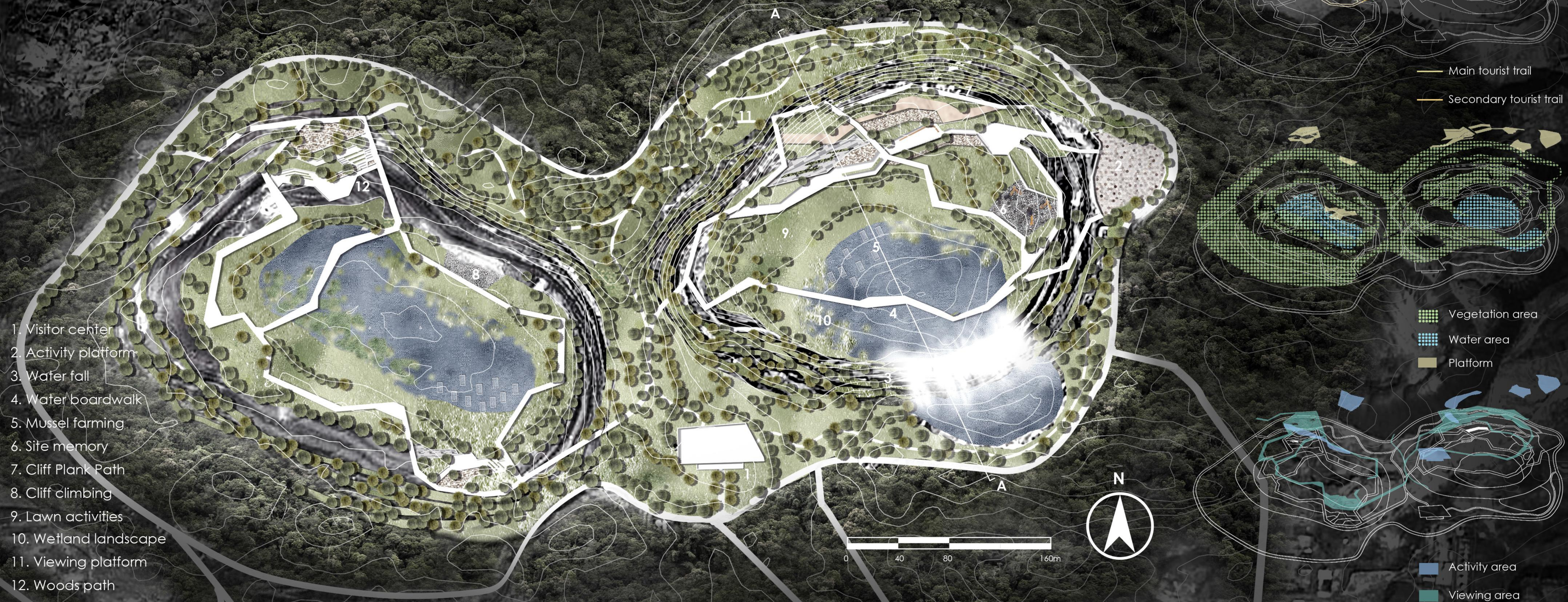
Water boardwalk

Build a plank road on the wetland, people can enter the quiet distance to watch the birds

Landscape revival of pit space

The site is a mining pit terrain, and the restoration of the mine pit landscape is mainly to re-energize the site. The terrain in the site can be roughly divided into four types according to the slope. According to the characteristics of each slope, different landscape types can be made, such as cliff plank road, waterfront platform, terrace landscape, etc., which can re-stimulate the vitality of the site.

Site Analysis



Soil remediation area Forest Tourist Area Water restoration area Waterfall Tourist Area

In this section, we can see the terrain change of the mine pit from north to south, and the different landscape types generated under each terrain.

Section A-A

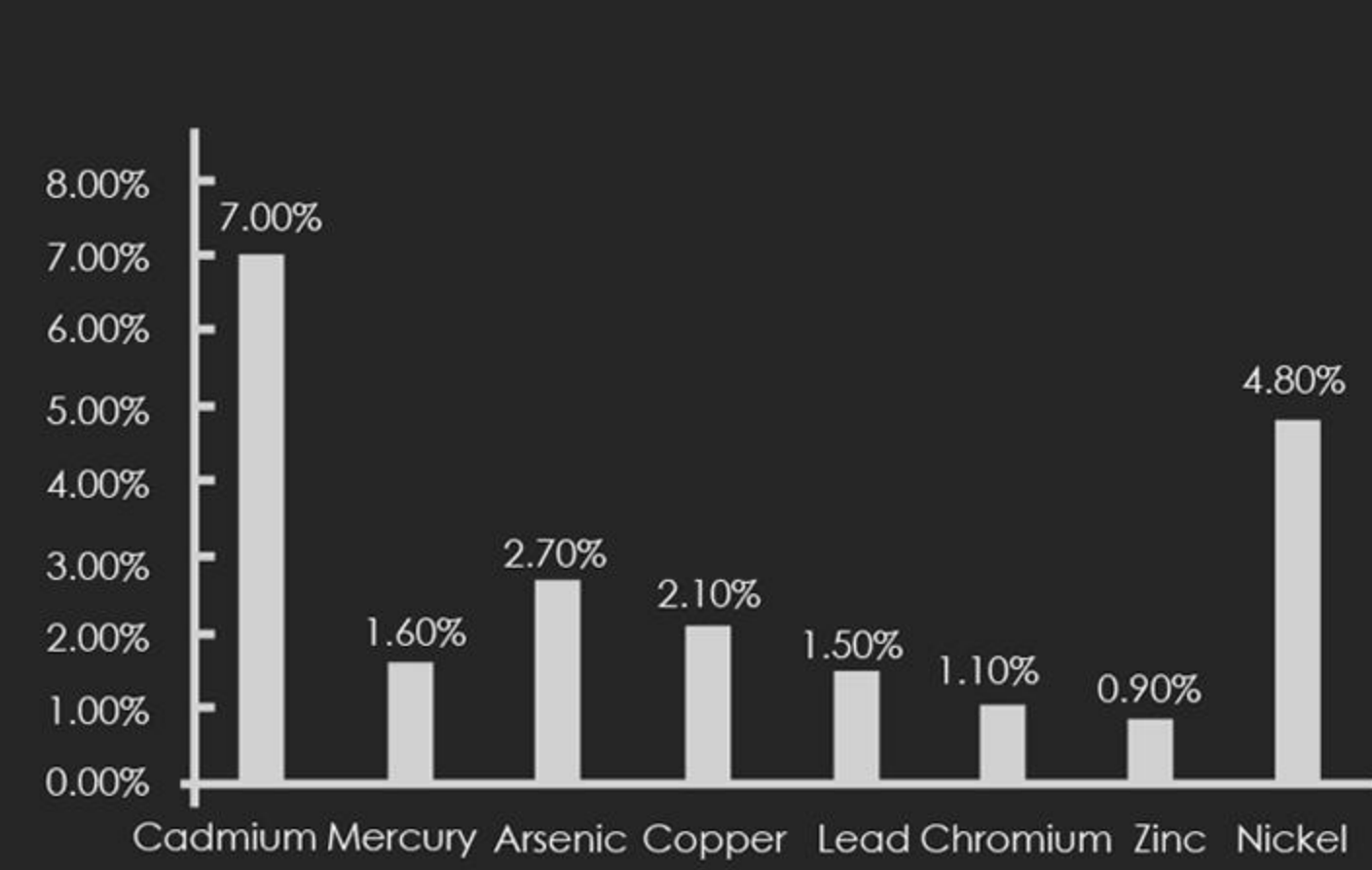
Soil remediation



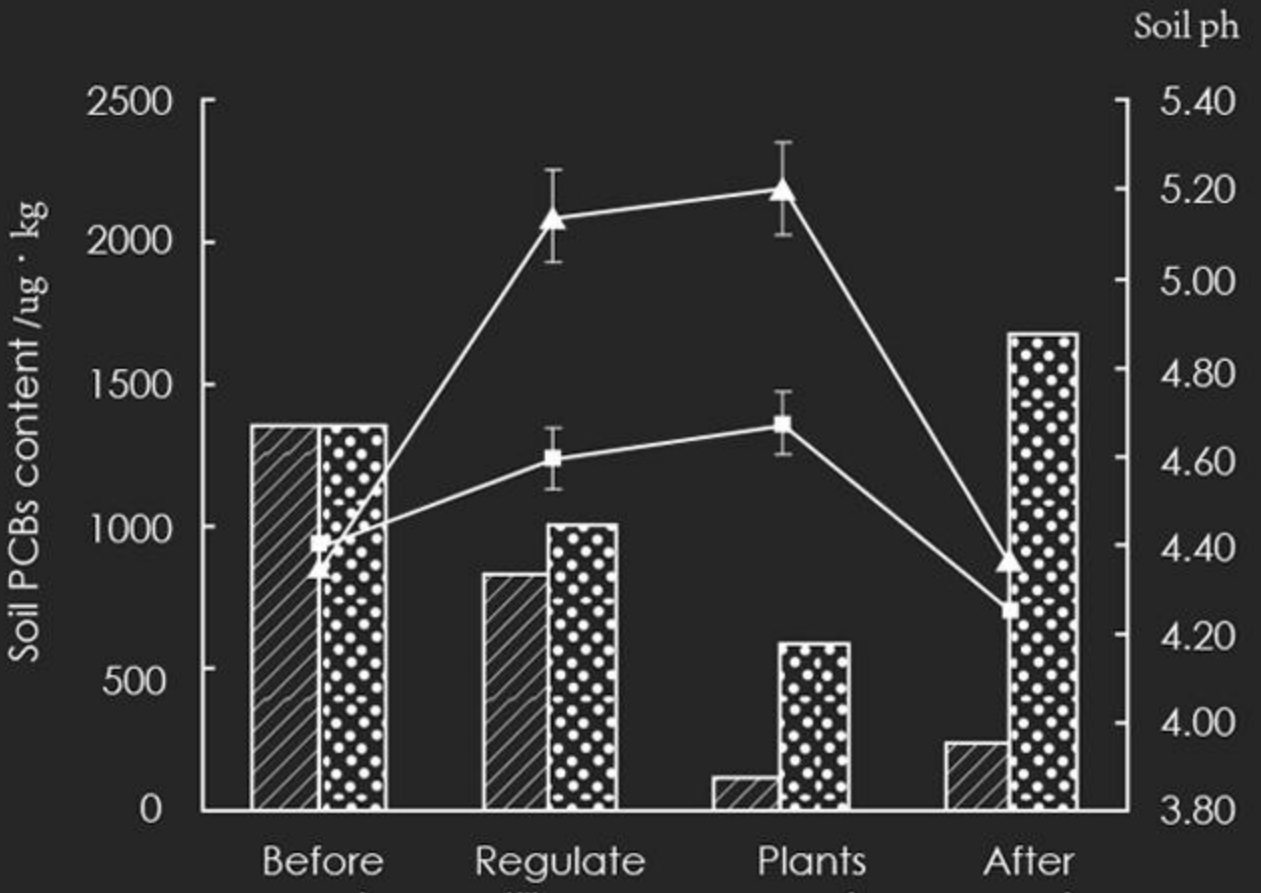
Plant configuration

Category	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Plant 7	Plant 8	Plant 9	Plant 10	Plant 11	Plant 12
Arbor	Ginkgo	Baiqian	Metasequoia	Poplar	Poplar	Weeping willow	Pyrus betulaeifolia	Sabina chinensis	Magnolia grandiflora	Toona sinensis	Catalpa	Sophora xanthantha
Shrub	Beijing mockorange	Spiraea	Bellow fruit	Weigela florida	Sunflower	Clove	Indian mustard	Sorbaria sorbifolia	Berberis thunbergii	Holly	Ligustrum quihoui	Phellodendron creeper
Cover Plants	Orychophragmus violaceus	White clover	Artemisia argyi	Astragalus pubescens	Ophiopogon japonicus	Triceratops	Aster	Thyme	Berberis	Euonymus	Honeysuckle	Fern

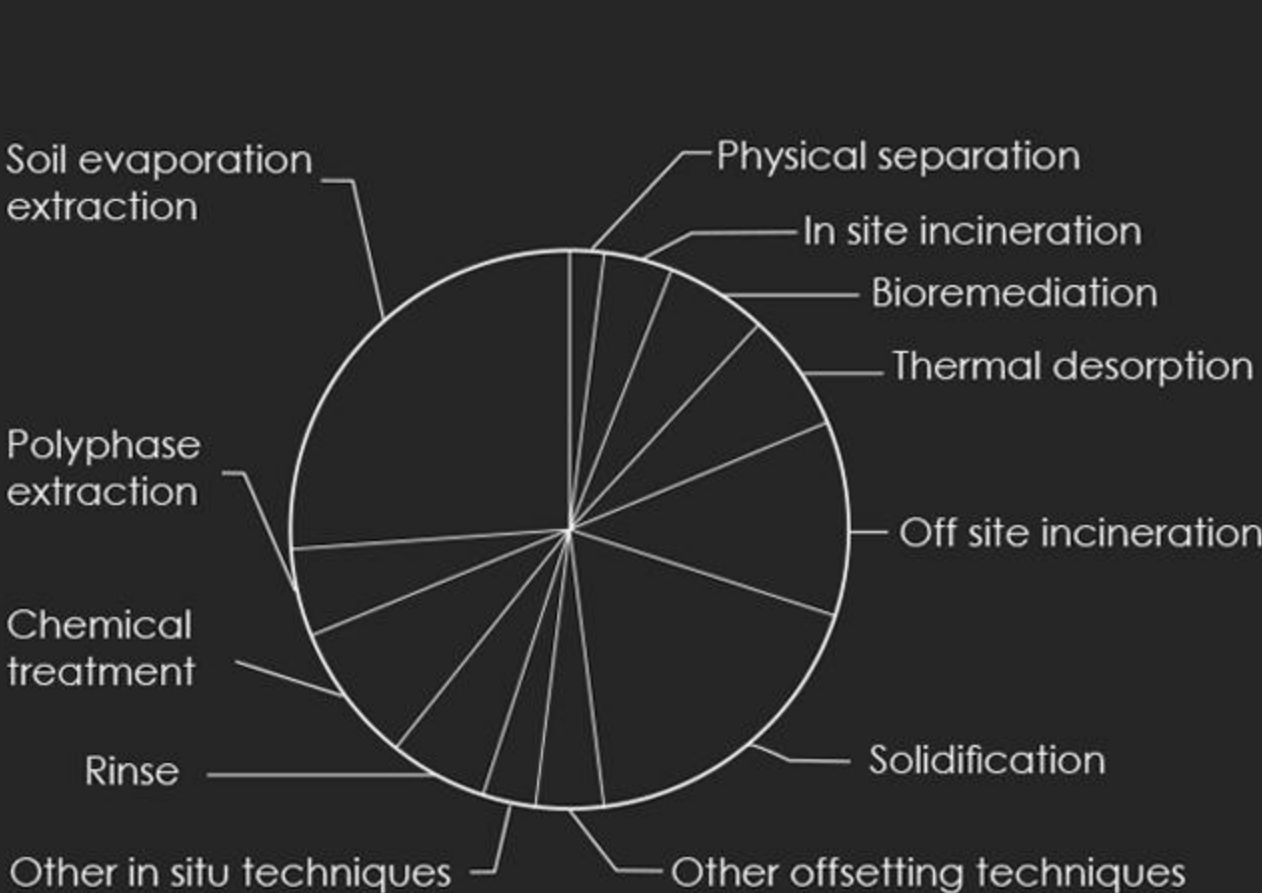
The main pollutants in mine soil



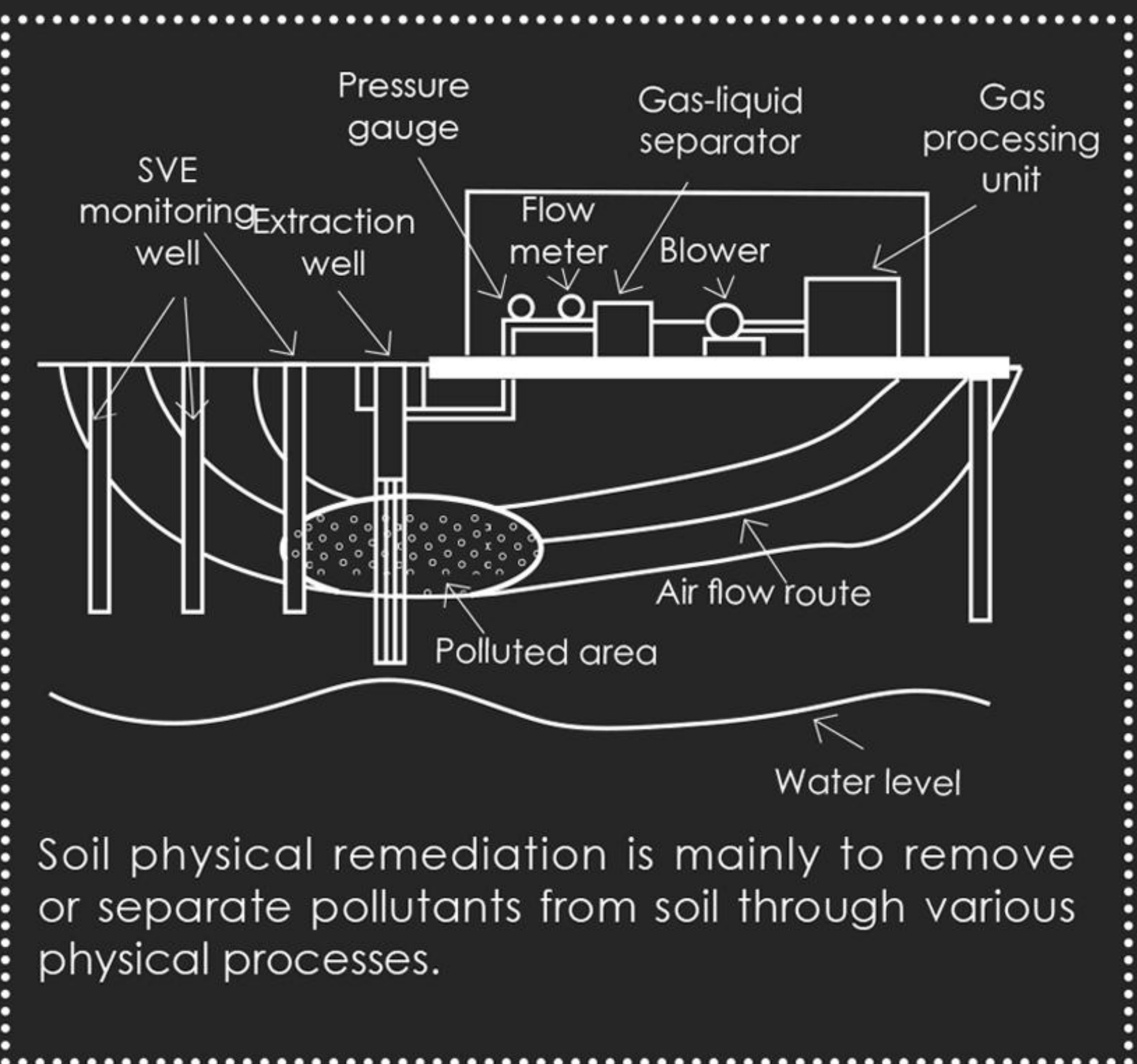
Soil Remediation Comparison



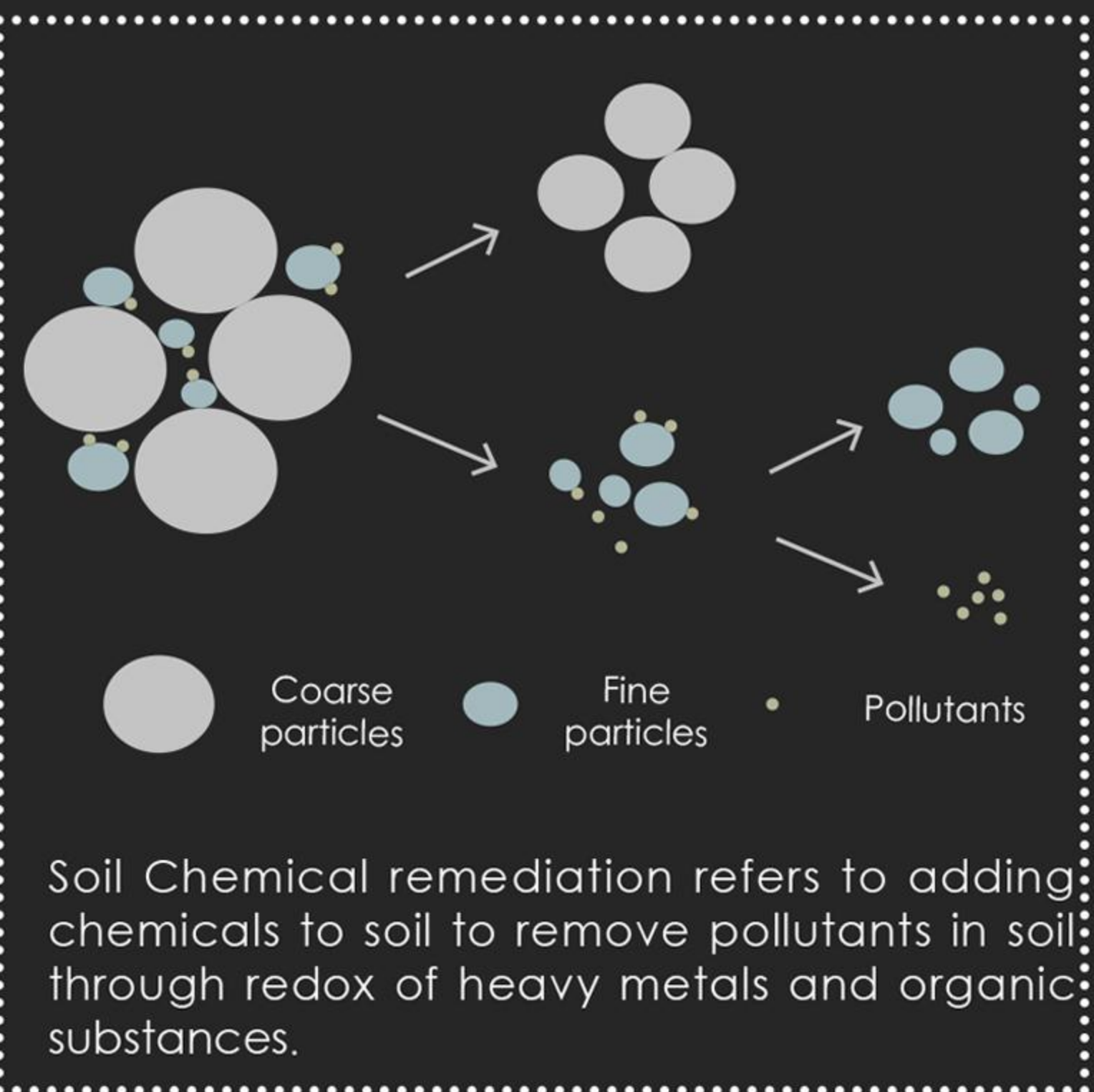
Soil remediation method



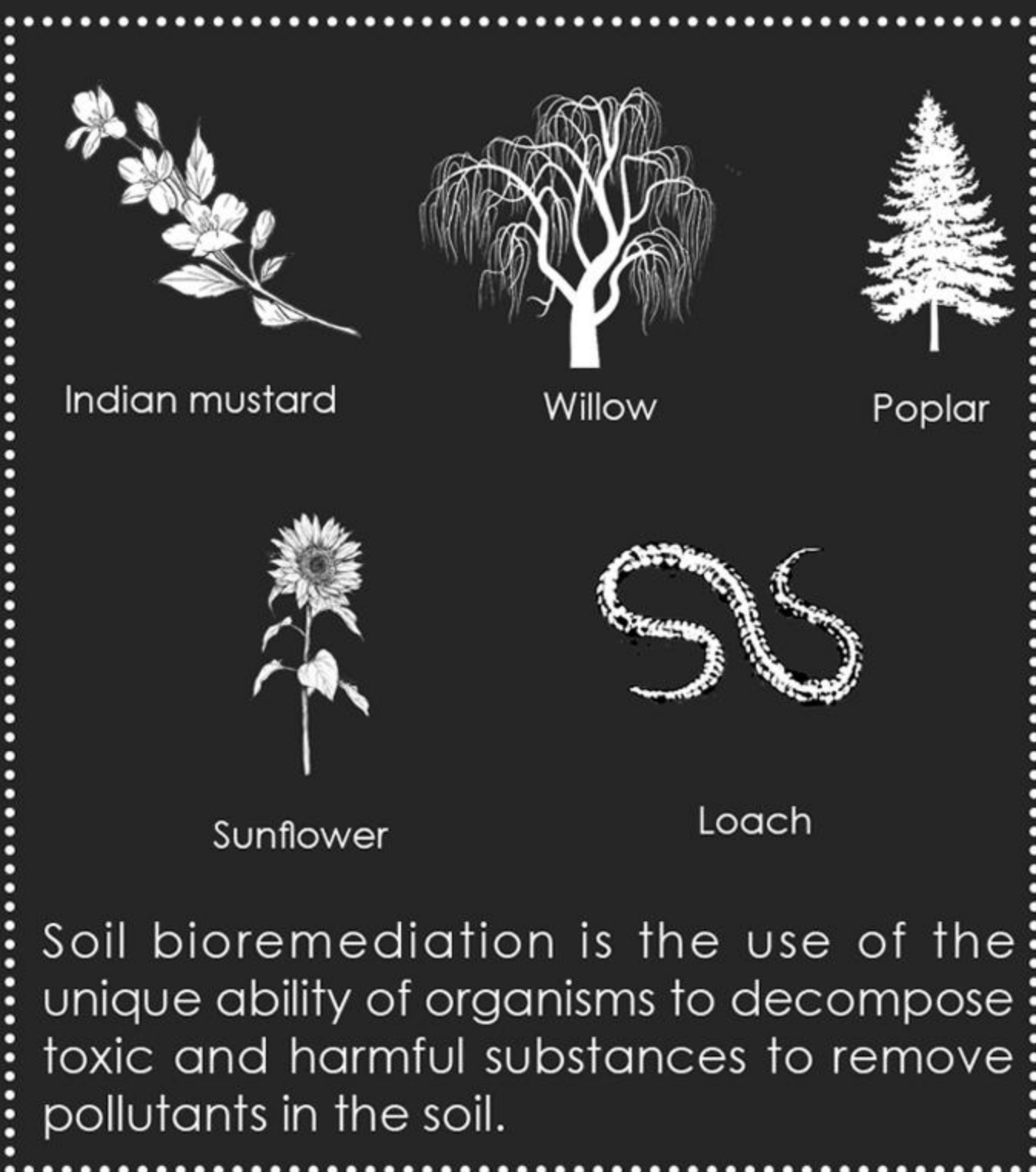
Physical restoration



Chemical restoration



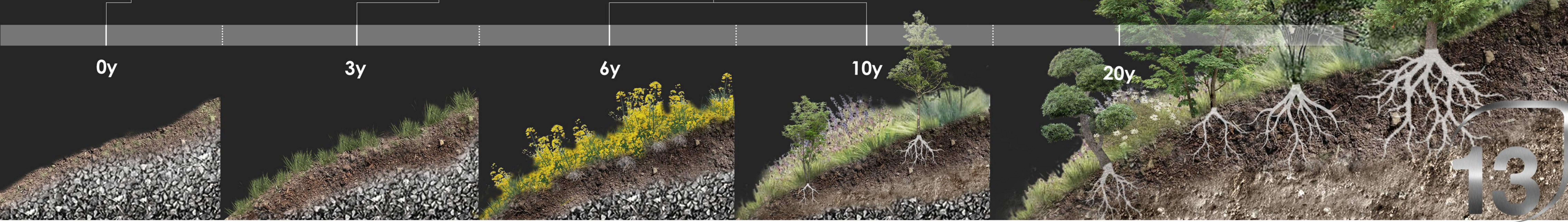
Bioremediation



Main insect species in the pit

Category	Species 1	Species 2	Species 3	Species 4	Species 5	Species 6
Butterfly	Ash Butterfly	Colias	Vanessa	Swallowtail Butterfly	Skipper	Satyr
Ants	Monomorium pharaonis	Formica gigantea	Loewe's ant	Stinking ant	worker-priest	

After several years of soil restoration, the soil fertility has gradually improved, enabling a variety of plants to thrive here, and many animals to inhabit here, making the entire mine ecosystem reach a virtuous circle, and finally forming a lush forest.



Water restoration

Aquatic plants are placed in the polluted waters of the mine, and plants with both water purification, ornamental and economic value are planted on the island formed by them, such as reeds, lotus, etc. The roots of aquatic plants have adsorption and absorption functions. The biochemical degradation of microorganisms and other processes can improve and purify the water quality, so that the water quality of the water area will continue to improve.

Changes in water quality over time



Abandoned mine

At the beginning, the water source in the mine was seriously polluted, with heavy metal content exceeding the standard. There were basically no living things in the water, and there were basically no green plants in the mine.

Plants remediation

Plant reeds, lotus and other plants in the water that can absorb pollutants and purify the water source. Plants are also used around the water source to improve the soil quality.

Aquatic animal remediation

After the water quality is improved to a certain extent, the aquatic animals such as mussels and oysters will be cultivated to further improve the water quality.

Ecological equilibrium

The water quality was further improved, the aquatic plants on the shore grew naturally, and the fish and shrimp in the water increased, gradually achieving the goal of ecological balance.

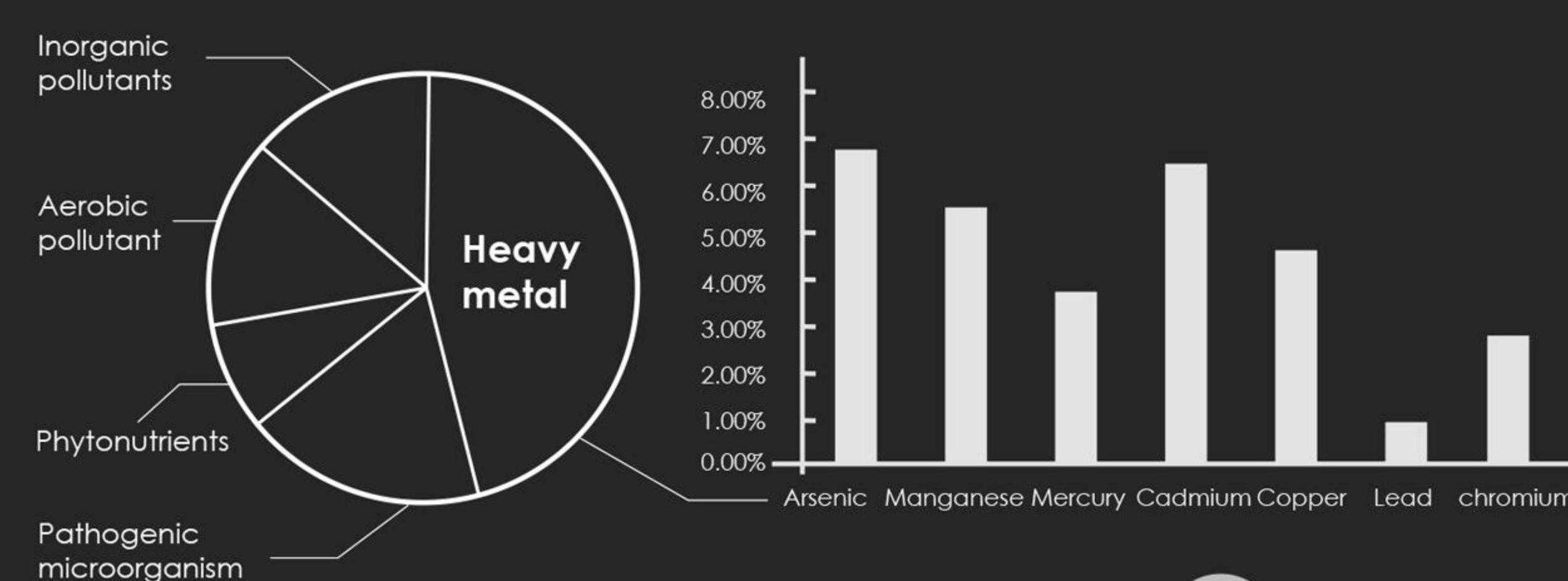
Wetland Park

The mine pit has become a wetland ecological environment. A large number of creatures come here and attract a large number of tourists.

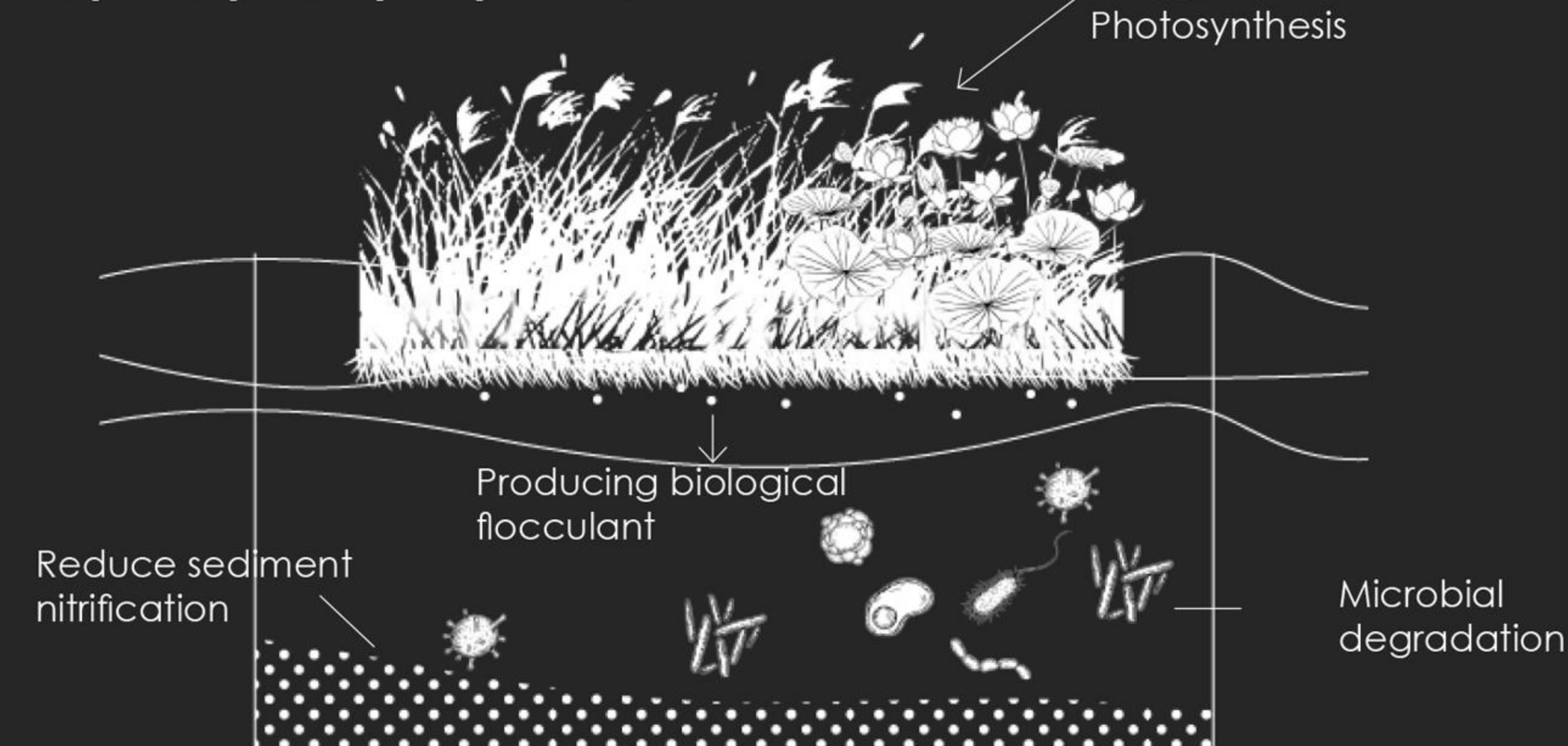
Plant type distribution



Main pollutants in water

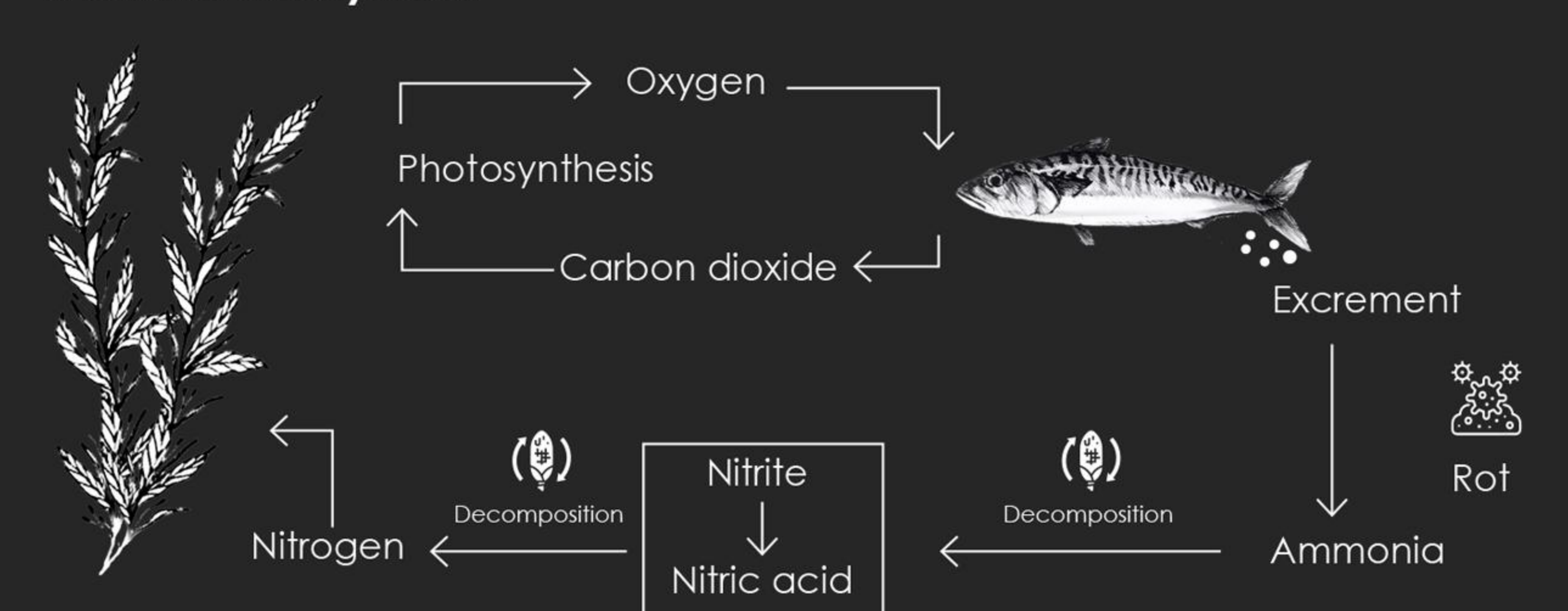


Aquatic plants purify water



Through the photosynthesis of plants, oxygen is transmitted to the root system, and biofilm is formed on the bottom surface of aquatic plants, which plays the role of contact oxidation and continuously removes pollutants in water. Plant roots secrete flocculants to promote the removal of suspended solids in water and improve the visibility of water bodies.

Wetland ecosystem



Aquatic plants and fish form a stable ecological chain in the water to achieve the purpose of continuous water purification without power.

Wetland animals and plants

